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SOUTH PLATTE RIVER BASIN WATER POLLUTION INVESTIGATION. EXHIBITS AND APPENDICES

Public Health Service
Kansas City, Missouri

July 1950

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[Prepared at request of & in cooperation with Bureau of Reclamation, Colorado State Dept of Public Health, & City & County of Denver, Colo.]

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(copy sent to NTIS)

Federal Security Agency
Public Health Service
Environmental Health Center
Cincinnati, Ohio

and

Missouri River Basin Office
Water Pollution Control Division
Kansas City, Missouri
July 1950

EXHIBITS AND APPENDICES

SOUTH PLATTE RIVER BASIN WATER POLLUTION INVESTIGATION

Prepared by the Public Health Service at the request of and in cooperation with the Bureau of Reclamation, the Colorado State Department of Public Health, and the City and County of Denver, Colorado.

227

EXHIBITS AND APPENDICES

SOUTH PLATTE RIVER BASIN WATER POLLUTION INVESTIGATION

EXHIBITS

Exhibit	Title	Page
I	Colorado-Big Thompson Project	229
II	Blue-South Platte River Project	234

APPENDICES

Appendix	Title	Page
"A"	Memoranda of Understanding	238
"B"	Stream Designations	246
"C"	Stream Pollution Survey of the Portions of the South Platte River and Cherry Creek which Lie within the City and County of Denver	247
"D"	Sample Reports on Typical Wastes Investigations	252
"E"	State Water Pollution Control Legislation	261
"F"	Beet Sugar Wastes Investigations	269
"G"	Bacteriological Study of Irrigated Fruits and Vegetables	293
"H"	Project Effects on Low-Flow Conditions in the South Platte River Basin	315
"J"	Summary of Individual Results	321

EXHIBIT I*
(To accompany map of Colorado-Big Thompson Project)

COLORADO-BIG THOMPSON PROJECT
COLORADO

(Data obtained from U.S.Bureau of Reclamation,Region 7,Denver,Colorado).

The Colorado-Big Thompson Project ~~will~~ provides for the stabilization of west slope waters and the diversion of surplus water from the headwaters of the Colorado River on the western slope of the Continental Divide to lands on the eastern slope in northeastern Colorado to supplement the present inadequate irrigation supply. An estimated average quantity of 257,000 acre-feet of water per annum is available for diversion from a point east of Grand Lake near the head of the Colorado River. This dependable supplemental supply will assure greater economic stability through reduction in drought hazards, more abundant crops, and increased income. Hydroelectric power will be developed from the water in its fall from the outlet of Alva B. Adams Tunnel to the eastern slope foothills reservoirs.

The general plan for the project provides for supplying supplemental water to approximately 707,000 acres of lands under cultivation as insurance against crop failure during dry seasons and the installation of a hydroelectric generator capacity of approximately 175,500 kilowatts for industrial and domestic use.

Water from the Colorado River will be stored in the Granby Reservoir on the western slope and then lifted a maximum of 181 feet by the Granby Pumping Plant into Shadow Mountain Lake. From there the water will be diverted through the 13.07 mile Alva B. Adams Tunnel. It will then pass through a series of conduits and power plants and be stored in the three foothills reservoirs, namely, Carter Lake, Flatiron, and Horsetooth Reservoirs. Water will be released from these reservoirs through supply canals into the Big Thompson and Cache la Poudre Rivers and St. Vrain Creek, to be rediverted through existing canal systems to lands lying within the Northern Colorado Water Conservancy District.

To replace the water diverted from the western slope, Green Mountain Dam and Power Plant were constructed on Blue River, located 16 miles southeast of Kremmling, Colorado. The water stored in Green Mountain Reservoir is released at appropriate times to avoid interference by the transmontane diversions with existing water rights on the Colorado River. Incidental to these releases, hydroelectric power is being generated.

Construction and operation of the project will change the regimen of the Colorado River, requiring improvements and supplemental facilities for the irrigation of ranches and domestic use along the Colorado River between Granby Dam and Kremmling, Colorado. Construction of these improvements and facilities is in progress.

The power plant now in operation at Green Mountain Dam on the western slope and the power plants to be constructed on the eastern slope

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* Certain changes in this project have been made since this section was prepared.

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will be interconnected with the power plants of the North Platte, Kendrick, Riverton, and Shoshone Projects operated by the Bureau of Reclamation in Wyoming and serving distributing agencies in Wyoming, Nebraska, and Colorado.

Although the diversion of water for irrigation is the principal purpose of the project, about 600,000,000 kilowatt-hours of firm electrical energy per annum can be produced. This is sufficient to supply a city of 500,000 population. Power is being supplied to Rural Electric Associations in North-eastern Colorado for domestic use and for operating irrigation pumps.

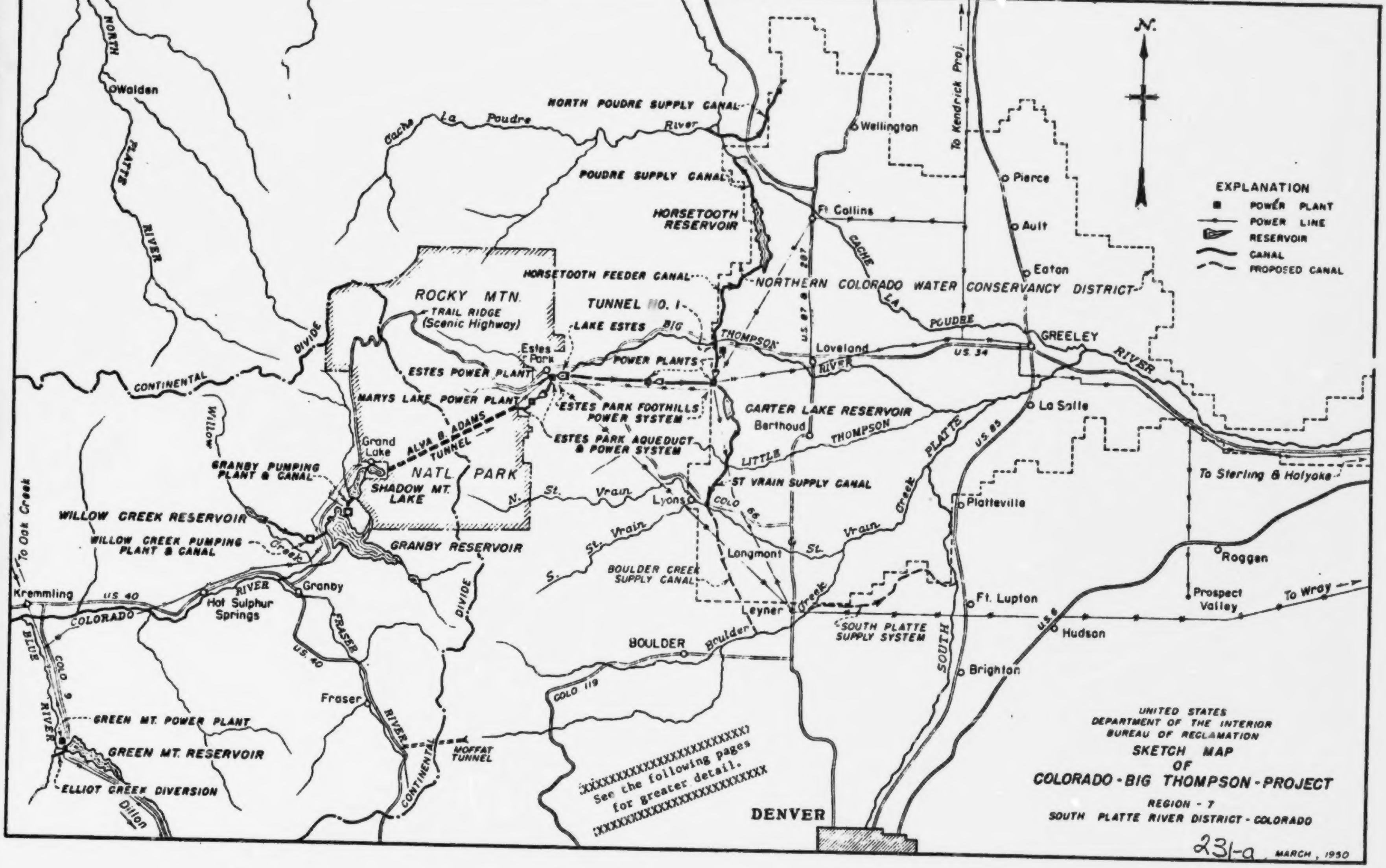
The repayment contract authorized by a majority of all taxpayers in the Northern Colorado Water Conservancy District and approved by the Secretary of the Interior, cleared the way for the start of construction in 1938. The first large unit of work undertaken was the Green Mountain Dam and Power Plant, located sixteen miles southeast of Kremmling, Colorado which was completed and placed in operation in May 1943. This was followed by the Alva B. Adams Tunnel and Shadow Mountain Dam, both now completed. A start was made on Granby Reservoir in 1942, but this work was stopped for the duration of the war. Construction work begun in 1946 includes the Granby Dam, the Estes Aqueduct and Power System from the Adams Tunnel to the Big Thompson River, the Horsetooth Reservoir and Feeder Canal of the Foothills Reservoir and Canal System.

Construction of the Granby Dam and Dikes on the western slope was begun in the summer of 1946 and it is expected that three and one-half years will be required to complete the structures. The dam and four dikes are to be of the earth and rock-fill type. Granby Reservoir formed by this dam and dikes has a surface area, 7,256 acres and a maximum storage capacity of 546,000 acre-feet. It will provide the storage capacity for the western slope collection system and from it water will be pumped through the Granby Pump Canal into Shadow Mountain Reservoir and Grand Lake from which it will flow by gravity through the Adams Tunnel to the eastern slope.

The Ramshorn Tunnel and Prospect Mountain Tunnel are a part of the Estes Park Aqueduct and Power System. The Ramshorn Tunnel, which had been "holed through" in November 1946, will connect the Aspen Creek Siphon with the Marys Lake Penstock. It is a 1.3-mile by 10'0" diameter, horse-shoe shaped and concrete lined tunnel. Its designed capacity is 550 second-feet with a water depth of 8.3 feet. The prospect Mountain Tunnel will connect the Prospect Mountain Conduit with the Estes Penstocks. It is a 1.0 mile-long, 12.5 feet diameter circular shaped and reinforced concrete lined tunnel. Its designed capacity is 1,300 second-feet flowing full and under pressure.

The Marys Lake Power Plant located about two miles south of the village of Estes Park, will be constructed to utilize the natural drop in the canal and tunnel system which carries water from the east portal of the Alva B. Adams Tunnel to the Big Thompson River below Estes Park. The plant will have one generating unit of 8100 kilowatt capacity and will operate under a maximum net head of 210 feet.

EXHIBIT I


N.
EXPLANATION
POWER PLANT
POWER LINE
RESERVOIR
CANAL
PROPOSED CANAL
NORTH PLATTE RIVER
Walden
Cache La Poudre River
NORTH POUDRE SUPPLY CANAL
POUDRE SUPPLY CANAL
HORSETOOTH RESERVOIR
HORSETOOTH FEEDER CANAL
Wellington
To Kendrick Proj.
Pierce
Ault
Eaton
Ft Collins
CACHE LA POUDRE
NORTHERN COLORADO WATER CONSERVANCY DISTRICT
GREELEY
RIVER
US 34
US 87 & 287
Loveland
BIG THOMPSON RIVER
TUNNEL NO. I
LAKE ESTES
POWER PLANTS
ROCKY MTN. NATL. PARK
TRAIL RIDGE (Scenic Highway)
Estes Park
ESTES POWER PLANT
MARYS LAKE POWER PLANT
ESTES PARK FOOTHILLS POWER SYSTEM
ESTES PARK AQUEDUCT & POWER SYSTEM
ALVA B. ADAMS TUNNEL
CONTINENTAL DIVIDE
Willow
Grand Lake
SHADOW MT. LAKE
GRANBY PUMPING PLANT & CANAL
WILLOW CREEK RESERVOIR
WILLOW CREEK PUMPING PLANT & CANAL
Creek
GRANBY RESERVOIR
To Oak Creek
Kremmling
US 40
COLORADO RIVER
Hot Sulphur Springs
Granby
FRASER RIVER
Fraser
BLUE RIVER
COLO 9
GREEN MT. POWER PLANT
GREEN MT. RESERVOIR
ELLIOT CREEK DIVERSION
Dillon
MOFFAT TUNNEL
CARTER LAKE RESERVOIR
Berthoud
LITTLE THOMPSON
ST VRAIN SUPPLY CANAL
N. St. Vrain
S. St. Vrain
Lyons
COLO 66
St. Vrain Creek
Longmont
BOULDER CREEK SUPPLY CANAL
Leyner
Boulder Creek
BOULDER
COLO 119
SOUTH PLATTE SUPPLY SYSTEM
SOUTH PLATTE
US 85
La Salle
Platteville
Ft. Lupton
Brighton
US 6
Hudson
Roggen
Prospect Valley
To Wray
To Sterling & Holyoke
DENVER

XXXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXX

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
SKETCH MAP
OF
COLORADO - BIG THOMPSON - PROJECT
REGION - 7
SOUTH PLATTE RIVER DISTRICT - COLORADO

231-a MARCH, 1950

EXHIBIT 1 (Continued)

The Estes Power Plant is located on the south bank of the Big Thompson River about one-quarter mile below the village of Estes Park. It will contain three generating units, each consisting of a vertical shaft, hydraulic turbine operating under a net head of 510 feet, direct-connected to a 15,000 kilowatt generator.

The Horsetooth Reservoir, located on the eastern slope, is the furthermost downstream Foothills Storage Reservoir in the Project. It is located about five miles west of Fort Collins, Colorado, and will be the eastern slope storage reservoir for the Cache La Poudre River and its North Fork irrigation district. The reservoir, an off-stream storage type, will be formed by four earth and rock-fill dams and one dike of the same type. Horsetooth Reservoir will have a surface area of 1,873 acres and a total storage capacity of 147,322 acre-feet. The principal outlet will be to the north through Horsetooth Dam with a very small outlet to the east through Soldier Canyon Dam. Construction started in the summer of 1946.

The Flatiron Reservoir, with an active capacity of about 400 acre-feet immediately north of the mountain by this name and located on Dry Creek, eight miles southwest of Loveland, has been added to the project plan to provide reregulation for power operations which will terminate at this reservoir, and to provide diversion for the Horsetooth Feeder Canal leading to that reservoir. The Horsetooth Feeder Canal will also be provided a connection with Big Thompson River near its crossing of that stream. The various works described will enable full irrigation operations. Arkins Reservoir has been eliminated from the project plan and its capacity transferred to Horsetooth Reservoir.

The ultimate power development will provide for a total installed capacity of 175,500 kilowatts in seven plants, which will develop about 752,000,000 kilowatt-hours of electrical energy annually. The Marys Lake and Estes Plants, together with the Green Mountain, will develop approximately 240,000,000 kilowatt-hours annually. Less than one-sixth of this power will be required for project operations and the balance will be available for sale.

Construction of power plants between Estes Park and the Foothills Storage Reservoirs will be undertaken when justified by power markets. Meanwhile, the water will be turned into the Big Thompson River at the Estes Power Plant to be carried by that stream to the diversion dam located in Loveland Canyon, about nine miles west of the Town of Loveland and thence carried to the storage reservoirs of the Foothills Storage System.

The transmission system will consist of several units, one of which is a 69,000-volt circuit, 51.5 miles in length, connecting the power plant at Green Mountain Dam with the Granby Pumping Plant and the west portal of the Alva B. Adams Tunnel. Other lines to be built more immediately comprise:

(a) Extension of the 115-kilovolt Greeley-Brush line to Sterling, Colorado, and a 69-kilovolt line from Sterling to Holyoke, and substations at Sterling and Holyoke with funds available for the 85-mile Brush-Sterling-Holyoke sections;

(b) A 38-mile 115-kilovolt line from Granby Pumping Plant over Buchanan Pass to Estes Park;

(c) A 31-mile 115-kilovolt line from the present terminus of the Estes Park to Loveland line to the Greeley Substation.

The lands to receive the supplemental supply of 310,000 acre-feet comprise 615,000 acres in northeastern Colorado.

There are 175,000 people living in the territory benefited by this project, who derive their livelihood either directly or indirectly from farming. The total actual value of all agricultural properties in the area, including equipment and livestock, now amounts to nearly $210,000,000.

It has been estimated that there has been an average annual loss, prior to project construction, of $4,700,000 due to the shortage of irrigation water. With present prices, this amounts to about $7,000,000 per year. The supplemental water with prewar prices will increase crop and livestock production fully $13,000,000 annually. With present prices the crop increase would be fully $22,000,000. Increased crops mean increased population on the farms and much more in the towns and cities.

This project differs from Reclamation projects in public land areas, where the irrigation system, from the main canals to the individual farm laterals must be constructed, settlers brought in, buildings erected, and a large amount of work done before the farms and irrigation systems are going units. On this project irrigation systems are built, buildings are erected, and the settlers are producing crops on the land. The supplemental water will enable planting larger parts of the farm in years of shortage, and the maturing of planted crops, as well as more stabilized cropping practices. More higher-value crops will be grown and more livestock and livestock products produced.

With the construction of the Colorado-Big Thompson Project, several outstanding recreational areas are being created. The reservoirs and adjacent areas will not only afford increased recreational use for hundreds of thousands of Colorado residents, but also for countless numbers of nonresidents drawn here by Rocky Mountain National Park and other recreational centers. Fishing, boating, hiking, picnicking, and camping will be popular at most of the reservoir sites and one or two may even become winter sports areas. Granby Lake will be the second largest body of water in the State.

The great increase of recreational activities on this Project means that concessions, resorts, cabin camps and other facilities will have to be provided for the people using the areas. This should have an excellent effect upon the economy of Colorado and the Nation. Recreational benefits are estimated at more than $600,000 annually.

EXHIBIT I (Continued)

In order to get the greatest recreational use out of this project, the Bureau is working closely with other Federal and State agencies and with interested groups on the recreational planning for these areas.

[redacted]

EXHIBIT II
(To accompany Map of Blue-South Platte Project)

BLUE-SOUTH PLATTE PROJECT

(Synopsis of talk given before meeting of Colorado Section
American Society of Civil Engineers on January 10, 1949
by J. M. Barrett) *

Development of the potential multiple-purpose Blue-South Platte Project would greatly augment the present limited supplies of water and electrical energy and is vitally important to the expanding agricultural and industrial economy of the upper South Platte River Basin.

Irrigation farming was started in this area in 1859 near Golden, Colorado. From this beginning, irrigation agriculture has grown to be the leading industry of the State. The growth of irrigation followed the pattern so common in the history of the West. An abundance of good land and the illusion of an unlimited supply of water in the streams brought about an expansion far in excess of the water supply actually available. The result is that thousands of acres of land now irrigated fall far short of their potential production because of a chronic shortage of irrigation water.

The effects of over-expansion and the possibility of supplementing South Platte water supplies with Western Slope diversions were recognized as early as 1889 when Hiram Prince addressed the State Legislature and asked for $25,000 to be used for finding a transbasin diversion route. In 1898, the water users in the Cache La Poudre area started construction of the "Grand River Ditch" to divert from the headwaters of the Grand (now the Colorado) River to the headwaters of the Cache La Poudre River.

Because of increasing needs for municipal water, the city of Denver in 1910, started investigating possible methods of importing water from the Western Slope. In 1936, the city's first diversion was made from the Fraser River watershed; however, further investigation and development has been continuous to the present time.

In 1936, the Bureau of Reclamation was authorized to start a comprehensive investigation of all water requirements of the upper South Platte Basin and the feasibility of supplying these requirements by importation of water from the Colorado River watershed. A report on one possible diversion scheme was completed in 1940 but was never approved nor released. The investigation was reopened by the Bureau in 1942 and has been continuous since that time. In November 1948, a preliminary draft of the planning report of the multiple-purpose Blue-South Platte Project was completed. This report is now being informally reviewed by various State and Government agencies. The reviewers' criticisms will be considered and the report revised to incorporate such changes as are justified. The revised report will then be transmitted through proper channels for approval and release.

---

* J. M. Barrett, Planning Engineer, Bureau of Reclamation, Denver, Colorado.

Throughout the investigation, the Bureau has enjoyed the full-hearted cooperation of the City of Denver, the State of Colorado, and all interested private and Government agencies.

In the course of the Bureau's investigation, all phases of the project plan and the effects of project development have been extensively studied. Hydrologic studies were made to determine the amount of water which could be feasibly diverted from the Colorado River watershed. Studies in which the actual operation of the entire collection, diversion, and utilization system was simulated were made to establish the most economic and advantageous arrangement and capacity of canals, reservoirs, powerplants, and other facilities.

Extensive surveys of canal, tunnel, and reservoir sites were made. Geological examinations and explorations were made of damsites, tunnel sites, and deposits of construction materials. Rough preliminary plans and cost estimates were prepared for all project features.

The field of irrigation and industrial economics has been thoroughly investigated by specialists in these fields. Their studies have included soil classification, present and potential agricultural practices and development, industrial development and potentiality, evaluation of benefits which would result from construction and operation of the project, and determination of the ability of the various users of project facilities and products to repay the costs of construction and operation of the project.

The possibility of using the water supply developed by the project for the generation of hydroelectric power has been critically examined. These studies were closely coordinated with the water supply studies in order to plan for the maximum use of the project for both water and power production. The location, capacity, and cost of power facilities have been determined. A survey of the power market area has been completed, showing the present and estimated future power requirements within the areas.

The incidental or secondary uses which project facilities might serve have also been studied. The possibility of providing some control of floods and the retention of sediment in the contemplated reservoirs have been investigated. The effect of the project operation on the problem of stream pollution has been studied. The National Park Service has considered the use of project facilities for recreational purposes. The Fish and Wildlife Service has investigated the effects of the project on the fish and game resources of the area.

The comprehensive plan for the development of the Blue-South Platte Project, as at present envisioned, would accomplish the following purposes:

1. Fully utilize the water supply of the upper South Platte Basin and supplement that supply through the annual importation of 430,000 acre-feet of water from the Colorado River Basin, specifically from the Eagle, Piney, Blue, and Williams River watersheds.

EXHIBIT II (Continued)

2. The increased water supply would supplement the water supply of 264,000 acres of land now irrigated and permit their full production; a full water supply would be furnished to 83,000 acres of land now dry-farmed; the increased application of water to these lands would inadvertently recharge existing underground reservoirs and permit the full development of 29,000 acres through pumping from groundwater.

3. Supplemental supplies of municipal water would be furnished to existing systems and permit the expansion of the Denver Metropolitan Area (Denver and surrounding communities) to a population of 1,000,000 or greater.

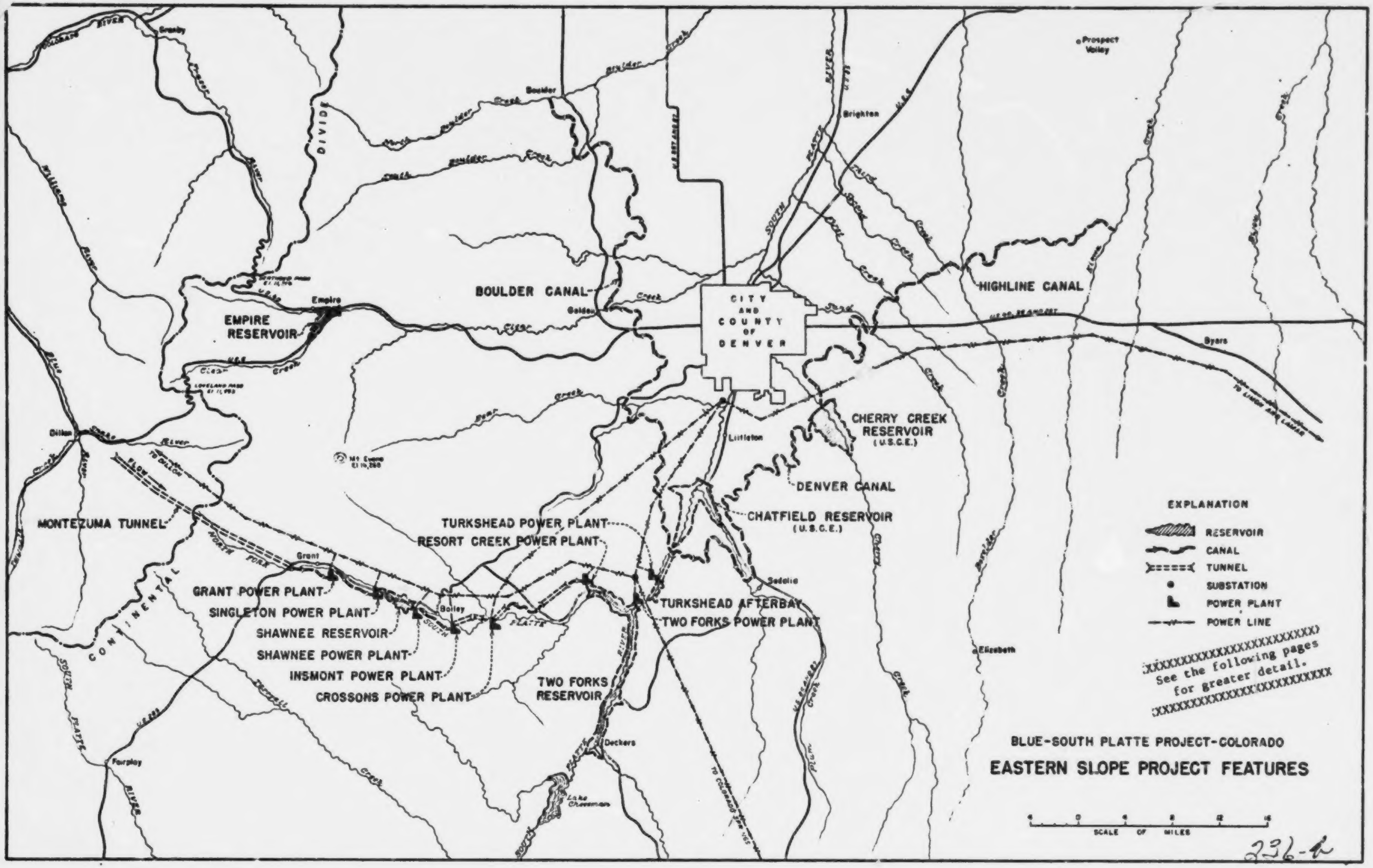
4. Produce annually 1,059,500,000 kilowatthours of marketable electric energy.

In operation, the project would collect, regulate, and divert the unused runoff from the upper watershed of the Eagle, Piney, Blue, and Williams Rivers. The water collected from these sources would be stored and controlled in a reservoir to be constructed on the Snake River above Dillon, Colorado. From this reservoir, diversion would be made to the North Fork of the South Platte River through an 18.4-mile long tunnel (the Montezuma Tunnel) through the Continental Divide. Between the outlet of the Montezuma Tunnel and the principal Eastern Slope storage reservoir to be constructed at the junction of the North Fork and main South Platte Rivers, the water would pass through a series of powerplants to utilize fully a drop in elevation of 2,507 feet.

Water would be released from Two Forks Reservoir to meet the water requirements of the irrigators in the area south of the Colorado-Big Thompson Project, to meet the municipal requirements of the Denver Metropolitan Area, and for the production of power at the Two Forks and Turkshead plants. The reservoir could also serve the Colorado Springs area by providing exchange water for that city's potential diversions from the South Platte.

In observance of a fundamental principle governing the diversion of Western Slope water to the Eastern Slope, the project plan includes replacement storage facilities for the full protection of present and possible future users of water for irrigation, domestic, or industrial purposes in the Colorado River Basin.

The works necessary to accomplish the purposes of the project would include: 80 miles of collection canals, 83 miles of collection and diversion tunnels, 21 miles of power conduits, 137 miles of distribution canals in the irrigated area, 9 principal storage reservoirs with a total capacity of 1,189,000 acre-feet, 8 hydroelectric power-plants with a total installed capacity of 265,800 kilowatts, and transmission lines and substations necessary to conduct power to the load centers.

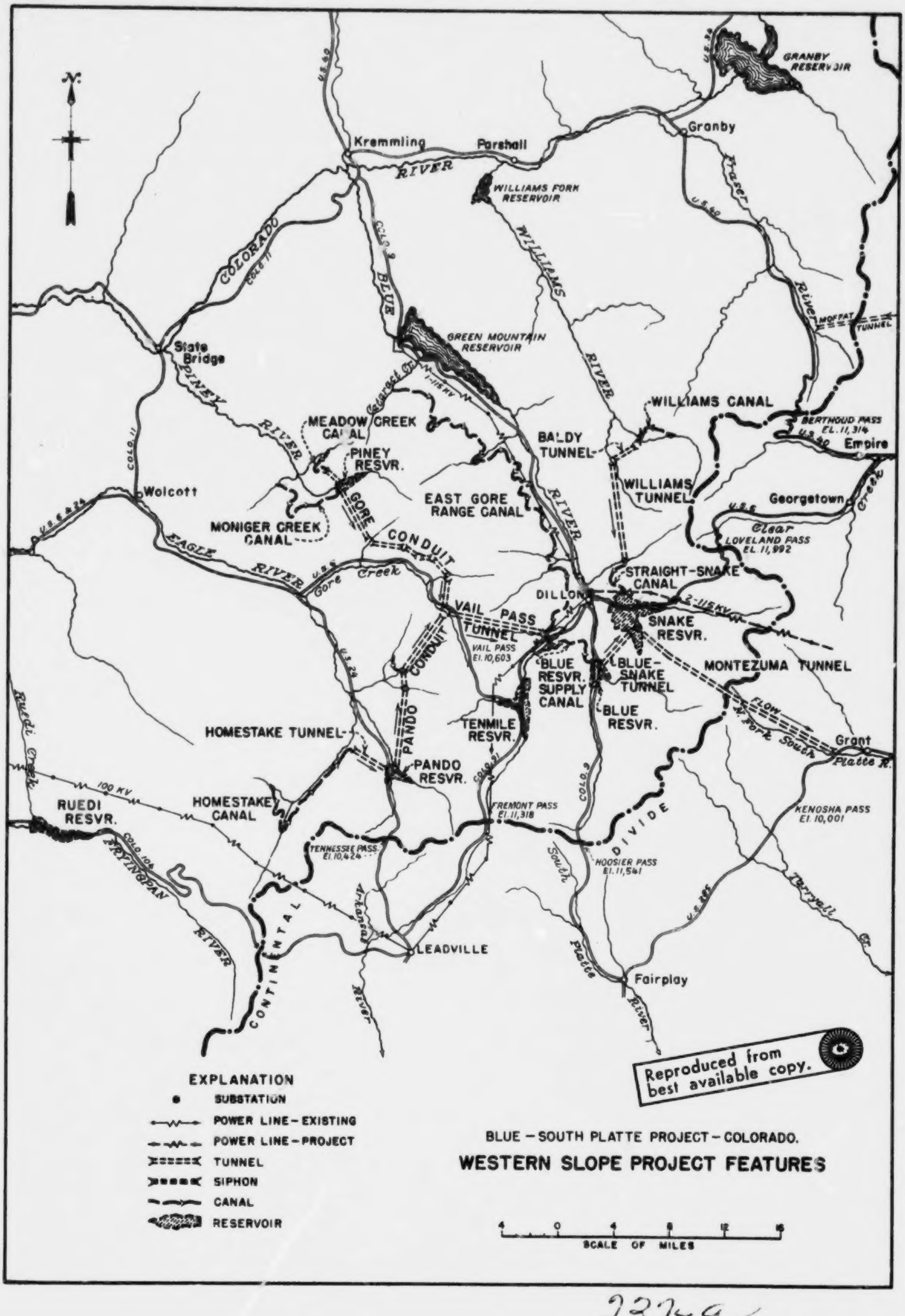

CITY AND COUNTY OF DENVER
BOULDER CANAL
HIGHLINE CANAL
EMPIRE RESERVOIR
CHERRY CREEK RESERVOIR (U.S.C.E.)
DENVER CANAL
CHATFIELD RESERVOIR (U.S.C.E.)
TURKSHEAD POWER PLANT
RESORT CREEK POWER PLANT
MONTEZUMA TUNNEL
GRANT POWER PLANT
SINGLETON POWER PLANT
SHAWNEE RESERVOIR
SHAWNEE POWER PLANT
INSMONT POWER PLANT
CROSSONS POWER PLANT
TURKSHEAD AFTERBAY
TWO FORKS POWER PLANT
TWO FORKS RESERVOIR
CONTINENTAL DIVIDE
Granby
Boulder
Brighton
Prospect Valley
Empire
Golden
Dillon
Littleton
Sedalia
Grant
Bailey
Deckers
Lake Cheesman
Fairplay
Elizabeth
Byers
Mt. Evans
South Platte River
North Fork
Blue River
Clear Creek
Bear Creek
Boulder Creek
Cherry Creek
Plum Creek
To Colorado Springs
To Limon and Lamar
EXPLANATION
RESERVOIR
CANAL
TUNNEL
SUBSTATION
POWER PLANT
POWER LINE
4 0 4 8 12 16
SCALE OF MILES

XXXXXXXXXXXXXXXXXXXXXXXX
See the following pages
for greater detail.
XXXXXXXXXXXXXXXXXXXXXXXXX

BLUE-SOUTH PLATTE PROJECT-COLORADO

EASTERN SLOPE PROJECT FEATURES

236-2


N
Granby Reservoir
U.S. 34
Granby
Kremmling
Parshall
River
Williams Fork Reservoir
Williams
Fraser
U.S. 40
Colorado
Colo. 11
Colo. 9
Blue
Green Mountain Reservoir
River
Moffat Tunnel
State Bridge
Piney
Cataract Cr.
Meadow Creek Canal
River
Piney Resvr.
Baldy Tunnel
Williams Canal
Berthoud Pass El. 11,314
U.S. 40
Empire
Wolcott
Gore
Moniger Creek Canal
East Gore Range Canal
Williams Tunnel
Georgetown
Clear Creek
U.S. 6
Loveland Pass El. 11,992
Conduit
U.S. 6 & 24
Eagle
River
Gore Creek
Straight-Snake Canal
Dillon
Vail Pass Tunnel
Snake Resvr.
Vail Pass El. 10,603
Conduit
Blue Resvr. Supply Canal
Blue-Snake Tunnel
Montezuma Tunnel
Flow
N. Fork South Platte R.
Grant
Blue Resvr.
Tenmile Resvr.
Homestake Tunnel
Pando
Pando Resvr.
U.S. 24
Ruedi Creek
100 KV
Ruedi Resvr.
Homestake Canal
Colo. 91
Colo. 9
Fremont Pass El. 11,318
Divide
Kenosha Pass El. 10,001
Colo. 104
Fryingpan
Tennessee Pass El. 10,424
South
Hoosier Pass El. 11,541
Tarryall Cr.
U.S. 285
River
Continental
Arkansas
Leadville
Platte
Fairplay
River
River
Explanation
● Substation
Power Line – Existing
Power Line – Project
Tunnel
Siphon
Canal
Reservoir
4 0 4 8 12 16
Scale of Miles

BLUE – SOUTH PLATTE PROJECT – COLORADO.

WESTERN SLOPE PROJECT FEATURES

Reproduced from best available copy.

EXHIBIT II (Continued)

An extensive economic and financial analysis of the project indicates it to be entirely feasible. The estimated total cost of the project would be about $400,000,000 based on 1947 price levels. This cost would be allocated to the primary purposes of the project--irrigation, municipal water, and power--and, to a less extent, to sediment control and recreation. Payments by irrigation and municipal water users and revenues from the sale of power would provide for the repayment of all reimbursable construction costs, in accordance with present Reclamation law. The benefits which would be derived from the project construction and operation have been evaluated on the basis of average prices during the 1939 to 1944 period. The ratio of the project costs to the benefits derived is 1.43 to 1 which indicates it to be a sound investment of public money.

APPENDIX "A"

MEMORANDUM OF UNDERSTANDING RESPECTING JOINT PROGRAM FOR STREAM POLLUTION INVESTIGATIONS OF THE SOUTH PLATTE RIVER BASIN

1. THIS MEMORANDUM OF UNDERSTANDING, made and entered into this 20 day of July 1948, pursuant to the authority contained in the Acts of June 17, 1902 (32 Stat. 388), and acts amendatory thereof or supplementary thereto, known as the Reclamation Laws; the Act of December 22, 1944 (48 Stat. 887), by and between the BUREAU OF RECLAMATION and the COLORADO STATE DIVISION OF PUBLIC HEALTH represented by the contracting officer executing this agreement, and the HEALTH DEPARTMENT OF THE CITY OF DENVER, COLORADO, also represented by the contracting officer executing this agreement on its behalf; all as parties of the first part; and the PUBLIC HEALTH SERVICE, as party of the second part.

WITNESSETH, THAT:

2. WHEREAS, the Bureau of Reclamation is now engaged in the construction of the Missouri Basin Project, and it has been determined by such agency and the health departments of the State of Colorado and the City of Denver, Colorado, that it is necessary to conduct a study of stream pollution in the South Platte River Basin in order to secure data for use in planning maximum water utilization in such basin as a part of the general plans for the Missouri River Basin Project, and that such study should include, among other things: (a) The extent, types and major sources of pollution; (b) A review of existing State laws in Colorado and Wyoming and pending legislation regarding pollution of public waters; (c) Determine bacteriological quality of water for irrigation uses at present and proposed diversion points and in existing canals; (d) Minimum stream flows necessary below the reservoirs for public water supplies and for sanitation purposes with present and contemplated pollution; (e) Public water supply needs; (f) Possible benefits to abatement of water pollution problems by reservoir releases; and (g) Recommendations and existing plans for pollution abatement; and

3. WHEREAS, the Bureau of Reclamation and the State of Colorado and the City of Denver do not have the necessary trained and experienced personnel required to perform the pollution survey and study contemplated herein, and do not have all of the necessary equipment required for such a study, and it is necessary therefore to request the Public Health Service to conduct the stream pollution survey of the South Platte River and its tributaries, and the said Public Health Service is willing to conduct such survey on the terms and conditions hereinafter set forth,

NOW, THEREFORE, it is mutually understood and agreed by and between the parties hereto as follows:

4. Beginning on or about July 1, 1948, or as soon thereafter as feasible, and continuing for a period of approximately one year thereafter:

(a) The Public Health Service will conduct a stream pollution survey of the South Platte River and its tributaries, which survey will include, among others, the items set forth in Article 2 hereof. The personnel involved in making such a survey shall be under the supervision of the Public Health Service during their work on the pollution survey. The Public Health Service shall assume full responsibility for the survey and the preparation of complete reports thereon. An interim report will be submitted by April 1949 and a final report which will include the findings, conclusions, and recommendations will be submitted as soon as practicable after the completion of field work but not later than July 1, 1950. The number of copies of the reports furnished to the participating agencies shall be as follows: 20 copies each to the Bureau of Reclamation and the State of Colorado, and 10 copies to the City of Denver. In addition, the Public Health Service will consult with the health officials of the States of Nebraska and Wyoming relative to their pollution problems as involved in the South Platte River Basin, and copies of the reports made by the Public Health Service will be furnished to these States.

(b) In connection with the survey contemplated herein, the Public Health Service will furnish, as required, the following services and facilities:

One (1) mobile laboratory unit.
Two (2) sanitary engineers (part time).
One (1) bacteriologist (part time).
One (1) chemist (part time).
One (1) biologist (part time).

(c) The Bureau of Reclamation will pay not to exceed $35,000 of the actual costs incurred by the Public Health Service in making the stream pollution survey. Payments will be made monthly upon receipt of certified vouchers.

In addition the Bureau of Reclamation will supply for the use of the Public Health Service in connection with the stream pollution survey such of the following as may be required by the Public Health Service:

(1) Drafting assistance.
(2) Maps, charts, hydrologic and other available data.
(3) 4 automobiles including all maintenance and operational expenses for the three sample collectors and the engineer in charge.

(d) The Colorado State Department of Health will provide the following for the use of the Public Health Service:

Laboratory services at Denver, Colorado, to the extent of 50 samples per week.

Laboratory services at Greeley, Colorado, to the extent of 30 samples per week.

One (1) sanitary Engineer, half-time and travel.

APPENDIX "A" (Continued)

The estimated value of such above-mentioned services is $11,300.

(e) The Health Department of the City of Denver, as its part of this cooperative agreement, will not share in the actual costs incurred by the Public Health Service in making such stream pollution survey, but will provide the following for use of the Public Health Service:

One (1) sanitary engineer, one-half of his time and travel.

The estimated value of such above-mentioned services is $2,500.

5. Where the operations of this contract extend beyond the fiscal year 1949 the contract is contingent upon appropriations to the U. S. Public Health Service for expenditures hereunder beginning July 1, 1949. In case such appropriations as may be necessary to carry out this contract are not made, the State and City agencies who are parties hereto release the United States from all liability due to the failure of the Congress to make such appropriation.

6. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this contract or to any benefit that may arise herefrom, but this restriction shall not be construed to extend to this contract if made with a corporation or company for its general benefit.

IN WITNESS WHEREOF, The parties hereto have caused this memorandum of agreement to be executed as of the day and date first above written.

BUREAU OF RECLAMATION

By /s/ W. E. BLOMGREN
Acting Regional Director Region 7
Denver, Colorado

HEALTH DEPARTMENT OF CITY OF DENVER

By /s/ JAMES P. DIXON M.D.
Director, Bureau of Health & Hospitals
Denver, Colorado

COLORADO STATE DEPARTMENT OF HEALTH

By /s/ R. L. CLEERE
Secretary and Executive Officer
Denver, Colorado

PUBLIC HEALTH SERVICE

By /s/ GLEN J. HOPKINS
Officer in Charge, Missouri River
Basin Office, Kansas City, Missouri

SUPPLEMENT TO APPENDIX "A"

MEMORANDUM OF UNDERSTANDING

between

COLORADO GAME AND FISH COMMISSION
Denver, Colorado

and

COLORADO DEPARTMENT OF PUBLIC HEALTH
Denver, Colorado

WHEREAS, under the laws of the State of Colorado the Colorado Game and Fish Commission, hereinafter referred to as the Commission, is charged with the regulatory authority over all wildlife and fisheries resources wherever found within Colorado; and also holds legal responsibility in the control and abatement of stream and lake pollution as far as these resources are concerned, and is charged with certain regulatory authority to abate such pollution, and

WHEREAS, the Colorado Department of Public Health, hereinafter referred to as the Department of Public Health, also holds legal responsibility in the control and abatement of stream and lake pollution as far as public health is concerned, and is charged with regulatory authority to control and abate such pollution, and

WHEREAS, the U. S. Public Health Service, by Federal law, is cooperating with various Federal agencies, states and municipalities in the conduct of comprehensive studies of water pollution for the purpose of devising means by which such pollution can be abated or controlled, and

WHEREAS, as one of the cooperative projects, the Department of Public Health has entered into a cooperative arrangement with the U. S. Bureau of Reclamation, the U. S. Public Health Service and the City of Denver in the conduct of a comprehensive study of water pollution in the South Platte River Basin, and

WHEREAS, the Colorado Game and Fish Commission is desirous of cooperating with the Department of Public Health in the conduct of this study,

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING WITNESSES:

The Commission agrees

1. To make available to the Department of Public Health and assign on the South Platte River Basin water pollution study two employees whose duties will be the collection of water samples, and whose salaries will be paid by the Game and Fish Commission subject to approval of the Governor of the State of Colorado and classification by the Colorado Civil Service Commission.

2. To make available to the Department of Public Health certain

equipment as required for the proper conduct of the South Platte pollution study in an amount not to exceed a cost of $500, such equipment to remain the property of the Game and Fish Commission, with the understanding that it shall be returned to the Commission upon the completion of the water pollution study, or upon termination of this agreement.

The Department of Public Health agrees

1. To use the services of the two men and the equipment hereinbefore mentioned solely for the purposes as expressed under the terms of this agreement.

2. To report to the Commission all the facts and findings as a result of the survey to be made under the terms of this agreement.

3. To advise the Commission of any legal actions that may be possible or that may be initiated as a result of the aforementioned survey.

4. To invite representatives of the Commission to meet with the Department of Public Health as often as may be necessary regarding actions or plans in accordance with the purposes and the terms of this agreement.

5. To furnish the transportation and pay the subsistence and traveling expenses of the two men supplied by the Commission under the terms of this agreement.

It is mutually agreed by the Commission and the Department of Public Health

1. To cooperate in the formulation and the carrying out of adequate and practical plans as a guide for future programs for the control and abatement of stream and lake pollution.

2. To issue all necessary instructions through the Director of the Commission and through the Director of the Department of Public Health to all proper personnel of the Game and Fish Department and of the Department of Public Health respectively, covering meetings, investigations and field work needed for the preparation and subsequent administration of all the aforesaid plans or programs.

3. To require as close cooperation in the field, including the prompt and complete interchange of information, as is practicable by the proper personnel of the Game and Fish Department and of the Department of Public Health in all matters pertaining to stream and lake pollution.

4. To scrupulously avoid, in the preparation of release and publicity material covering the abatement or control of stream or lake pollution in the State of Colorado, any expressed or implied divergence of opinion by the Commission and the Department of Public Health; and endeavor to present a united front to the general public and to all especially interested parties.

5. That the Directors of the parties to this agreement will cooperate in all publicity questions of mutual interest, and will set up

instructions to guide their subordinates in avoiding publicity of an overlapping character.

6. That it will be the responsibility of the Directors of the parties to this agreement to promptly and fully consider all complaints and suggestions and make adjustments if possible in accordance with the terms of this agreement.

7. That it is expressly stipulated and agreed to by both parties that each and every provision of this memorandum of understanding is subject to the laws of the State of Colorado and the laws of the United States.

8. Nothing in this agreement shall be construed as obligating the Commission or the Department of Public Health in the expenditure of funds for the future payment of money in excess of appropriations authorized by law.

9. That this agreement shall become effective as soon as signed by the parties hereto, and remain in force until terminated by mutual agreement or by either party upon ninety days (90 days) notice in writing to the other of their intentions to so do.

10. That amendments to this agreement may be proposed by either party and shall become effective upon approval by both parties.

Witness: /s/ R. M. ANDREW JR.

Date: November 23, 1948

/s/ C. N. FEAST
C. N. Feast, Director
Colorado Game and Fish Commission

Witness: /s/ M. CANFIELD

Date: 11-23-48

/s/ R. L. CLEERE
R. L. Cleere, Executive Director
Colorado Department of Public Health

SUPPLEMENT TO APPENDIX "A"

SUPPLEMENTAL MEMORANDUM OF UNDERSTANDING RESPECTING JOINT PROGRAM FOR STREAM POLLUTION INVESTIGATIONS OF THE SOUTH PLATTE RIVER BASIN

1. THIS SUPPLEMENTAL MEMORANDUM OF UNDERSTANDING is entered into this 1st day of July, 1949, between the BUREAU OF RECLAMATION and the U. S. PUBLIC HEALTH SERVICE for the purpose of continuing the stream investigation initiated during the fiscal year 1949 under a MEMORANDUM OF UNDERSTANDING dated July 20, 1948, Respecting Joint Program for Stream Pollution Investigations for the South Platte River Basin.

2. Since it is necessary to continue the field work of the South Platte water pollution survey during the fiscal year 1950, and since the U. S. Public Health Service is without funds to furnish the necessary motor vehicles and supply the required hydrometric data, the Bureau of Reclamation and the U. S. Public Health Service hereby agree as follows:

a. The Bureau of Reclamation will permit the Public Health Service, Environmental Health Center, to retain, on a memorandum receipt, for the duration of the fiscal year 1950 and to use 4 Bureau of Reclamation vehicles described as follows:

(1) Ford 4-door sedan, 1942 6-cyl. super deluxe. Motor and serial No. IGA-97312, License No. I-11134.

(2) Ford 4-door sedan, 1942 6-cyl. super deluxe. Motor and serial No. IGA-72867, License No. I-11135.

(3) 1942 Chevrolet 2-door sedan, Motor No. BA-381230, Serial No. 9BH01-14621, License No. I-11317.

(4) 1941 2-door Pontiac sedan 8-cyl., License No. I-26141.

b. The U. S. Public Health Service agrees to:

(1) Provide all operational and maintenance expenses incident to the use of the above vehicles on the South Platte River water pollution survey.

(2) Return the vehicles at the expiration of their use period in a condition comparable to that in which the vehicles are received by the Public Health Service, normal wear and tear excepted.

(3) Continue to furnish the Bureau of Reclamation, South Platte River Office, with monthly mileage reports.

(4) Present the cars to a Government garage for the required service inspections at the end of each 1,000 and 5,000 mile operational periods, as required by Bureau of Reclamation regulations.

SUPPLEMENT TO APPENDIX "A" (Continued)

(5) Return to the Bureau any of the vehicles listed above which may be scheduled for trade-in on new replacement vehicles, in which event the Bureau will supply a replacement vehicle for use of the Public Health Service.

c. Prior to incurrence of any expense in connection with major repairs on the said vehicles which may become necessary, except for damage occasioned by negligent operation of the vehicles by the Public Health Service, both parties to this agreement shall concur as to the advisability of making such major repairs.

d. Incident to the assignment of the above vehicles to the Public Health Service, the cars will be taken to a Government garage where they will be given complete and thorough examination as to their present mechanical condition and shall be placed in good operating condition. A record shall be made by the garage, outlining the exact condition of each car at the time of inspection. Upon return of the cars to the Bureau of Reclamation by the Public Health Service, a similar report shall be prepared for the cars immediately prior to their return.

e. In addition to the loan of the above vehicles, the Bureau of Reclamation will continue to furnish the U. S. Public Health Service with hydrometric data as may be required during the fiscal year 1950 to continue the field survey of the South Platte Basin. It is anticipated that the field work requiring this service will terminate at the end of the present calendar year.

The parties hereto have caused this supplemental memorandum of understanding to be executed as of the day and year first above written.

BUREAU OF RECLAMATION

By /s/ W. E. BLOMGREN
Acting Regional Director, Region 7,
Denver, Colorado

PUBLIC HEALTH SERVICE

By /s/ C. T. CARNAHAN
Public Health Engineer, Officer in Charge,
South Platte Water Pollution Studies,
Environmental Health Center,
Denver, Colorado

APPENDIX "B"

SOUTH PLATTE RIVER BASIN
WATER POLLUTION INVESTIGATION

Stream Designations

Sampling stations for each creek are identified by the following symbols:

South Platte River	SP
Tarryall Creek	Ta
Trout Creek	Tr
N. Fork, S.Platte	SP-NF
Plum Creek	Pl
Bear Creek	Be
Turkey Creek	Be-Tu
Cherry Creek	Ch
Sand Creek	Sa
Clear Creek	Cl
St. Vrain Creek	SV
North St. Vrain	NSV
Middle St. Vrain	MSV
South St. Vrain	SSV
Boulder Creek	SV-Bo
South Boulder Creek	SV-SBo
Thompson River	T
Little Thompson	T-LT
Fall River	T-F
Buckhorn Creek	T-Bu
Cache la Poudre River	ClP
North Fork	ClP-NF
Lone Pine Creek	ClP-NF-LoP
Cache la Poudre (cont'd)	ClP
Boxelder Creek	ClP-Box
Lone Tree Creek	LoTr
Crow Creek	Cr
Little Crow	Cr-LC
Coal Creek	Cr-Co
Boxelder Creek	Box
Kiowa Creek	K
Commanche	K-Com
Bijou Creek	Bi
West Bijou Creek	Bi-WF
Cat Creek	Ca
Badger Creek	Ba
Beaver Creek	Bea
Spring Creek	Sp
Rush Creek	R
Lewis Creek	Le
Cottonwood Creek	Cot
Lodgepole Creek	Lod
South Fork	Lod-SF
Mud Creek	Lod-Mu
Cow Creek	Lod-Cow
Wabrath Creek	W

Tributaries of creeks follow the designation of the main stem designation, viz., Lone Pine Creek, which is a tributary of the North Fork of the Cache la Poudre River, would be ClP-NF-IoP.

APPENDIX "C"

STREAM POLLUTION SURVEY OF THE PORTIONS OF THE SOUTH PLATTE RIVER AND CHERRY CREEK WHICH LIE WITHIN THE CITY AND COUNTY OF DENVER.*

Section I

On September 3, 1948, a stream pollution survey of that portion of the South Platte River and Cherry Creek which lies within the city limits of Denver was commenced by the Sanitation Division of the Bureau of Health and Hospitals. This survey was made in cooperation with the United States Public Health Service and the Colorado Department of Public Health as a part of the South Platte River Pollution Survey now being conducted by those agencies. The purpose of this survey was to determine those industries which contribute liquid waste materials to either of these streams and if possible to discover the approximate quantity and content of the waste. The survey was confined to field surveys of the various industries and the results were entered on a generalized industrial waste form. No stream samples were taken, waste flow was not gauged, nor was any remedial action taken.

Over a period of two months, seventy-two business establishments were checked and inspection forms filled out on thirty-two of these. The remainder were eliminated from consideration as field inspections and questioning of the management revealed that they contributed nothing to the pollution in the river. No report sheets were filled out on the establishments.

A summary of the survey findings of the thirty-two establishments follows:

Establishment	Date Surveyed	Quantity of Waste contributed to River (gpd)	Nature of Waste
Swift Packing Company	9-20-48	None**	
Armour Packing Company	9-21-48	None	
Cudahy Packing Company	9-14-48	None	
Capitol Packing Company	9- 8-48	165,000	Cooling Water
Landers Packing Company	9- 7-48	None	
Adams Packing Company	9-13-48	100,000	Washings from Gut Room Large Amounts of Paunch Manure
Pepper Packing Company	9- 9-48	Unknown***	Blood, Paunch Manure***
K & B Packing Company	9- 9-48	None	
Denver Union Stockyards	9-21-48	No Estimate Available	Wash water from pans contain grains, hay, manure, etc.

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* City and County of Denver are one and the same.

APPENDIX "C" (Continued)

Establishment	Date Surveyed	Quantity of Waste Contributed to River (gpd)	Nature of Waste
Union Rendering Company	9-20-48	None	(Have line to river--sealed and locked)
Jada Sudsation	9-27-48	None	
Colorado & Southern Roundhouse	9-27-48 9-28-48	No Estimate Available	Wash water --small quantity oil and grease
Denver Iron Works	9-28-48	None	
Public Service-Lacombe Addition	9-28-48	44,000,000	Cooling Water
Acetylene Service Co.	9-29-48	6,000	Water and Lime Mixture Lime deposited in river
Maddox Ice Company	10-15-48	252,000	Cooling Water
D & R G Roundhouse	10-13-48	No Estimate Available	Wash water--oil, grease, some acid and lye
Maul's Rug Cleaning Co.	10- 5-48	No Estimate Available	Soapy wash water from cleaning carpets
Bud's Rug Cleaning Co.	10- 5-48	No Estimate Available	Soapy wash water from cleaning rugs
General Chemical Co.	10-15-48	800,000	Mostly cooling water Some acid waste, small quantity of Iron Oxide
U. P. Roundhouse	10-25-48	None	
Burlington Roundhouse	10- 5-48	No Estimate Available	Wash water--oil and grease
Shattuck Chemical Co.	10- 4-48	----------	
Gates Rubber Company	10-25-48	432,000	Cooling water with small amount of wash water
Tramway Power House	9-14-48	7,440,000	Cooling water
American Smelting and Refining Company	10- 5-48	None****	
Cambridge Dairy	9- 3-48	No Estimate Available	Wash water from barns Some straw, manure, etc.
Merchant's Extract Co.	9- 3-48	None	
Mil Producers	9- 7-48	None	
Canada Dry Bottling Co.	9-17-48	None	
Carlson Frink Dairy	9-17-48	None	
Police Garage	9- 7-48	None	
City Dump--31st and Sand	-------	No Estimate Available	Organic in nature due to decaying matter
Denver Sewage Treatment Plant	9-19-48	----------	Primary treated sewage

**Swift Packing Plant has line running to river but this is closed off.

***This plant is now working on plans to screen their waste material and pump all waste into city sewerage system.

****Overflow effluent from cess pools serving two small toilet rooms discharges into irrigation ditch. The Denver Health Department has ordered this discontinued and company has planned to install new septic tanks and leaching wells or connect to city sewer, if possible.

APPENDIX "C" (Continued)

Section II

RAILROAD REPAIR SHOPS SURVEYED

Four railroad repair shops were surveyed and three of these were found to be contributing unestimated quantities of oily waste to the river. The three companies involved are: Burlington Roundhouse, Denver and Rio Grande Western Roundhouse, and the Colorado and Southern Roundhouse. The Burlington and D & R G have no treatment whatsoever, but the Colorado and Southern Roundhouse has a series of detention basins to recover as much oil and grease as possible.

The effects of the oily waste are evidenced along the river bank by deposits of grease and by the oil slick on the water. The slick is very pronounced for some distance down the river and although less evident, can be seen quite easily for a distance of one-half mile or more below the outlet.

Section III

MEAT PACKING PLANTS AND STOCKYARDS

There are eight meat packing houses within the city limits of Denver, of which six are United States Government inspected. Most of the plants maintain their own rendering plants and the general plant sewerage system.

A stockyard association provides stockpens for the three largest meat packing plants but the five smaller companies maintain their own pens, etc.

The total waste from the packing houses, stockyards, and rendering plants amounts to approximately 4,040,500 gallons per day. About 62,000 gallons of this is discharged into the river, the remainder to the city sewage disposal plant. A further breakdown of the discharge to the river shows that approximately 40,000 gallons is cooling water, roof and land drainage, and general storm run-off. An estimated 2,000 gallons is water used by the stockyards to flush stand-by lines from stock pens to prevent silting. Some grain, straw, and manure particles are carried in this water and deposited along the river banks. The remaining 20,000 gallons is discharged from the gut room of the Adams Packing Company and contains much paunch manure and other typical waste material from the process. Considerable deposition of manure is evident along the bank of the river and the finer particles of waste are carried some distance down the river by the current. Since the general character of the river water is muddy and turbid, it is difficult to determine to what extent the waste manure is dispersed and carried along with the river flow.

At the time of the original survey, Pepper Packing Company was not found to be discharging wastes into the river. However, during subsequent investigations in that area, considerable quantities of blood, paunch manure, and similar wastes were found running from a drain to the river. This was eliminated and no changes made in the original survey report. Similar occurrences were noted later but due to the fact that Pepper Packing Company is co-operating with the Health Department in an effort to eliminate the problem, no changes have been noted on the survey report of this establishment.

Section IV

DUMPS AND DUMPING

City Dump at 31st and Sand*

The city-operated dump is in a flooded abandoned sand pit at 31st and Sand Street. Recently a culvert was put in between the pit and the South Platte River to drain the pit. It is difficult to estimate the quantity of waste discharged through this culvert. The waste is organic in nature, and only partially decayed, thus contributing an appreciable quantity of putrescible material to the river.* (See footnote).

Unauthorized Dumping in Cherry Creek

The section of Cherry Creek between Blake Street and the junction of Cherry Creek with the South Platte River has apparently been used as a dump by many small business establishments in that vicinity. This part of the creek is littered with cans, bottles, cardboard cartons, paper, and other types of trash. It is very difficult to determine the source of this material since it is very general in extent and nature. The degree of pollution contributed by this material is also indeterminate but undoubtedly does have some effect on the quality of the water (in addition to creating an unsightly appearance).

City of Denver Sewage Treatment Plant

At the present time the City of Denver is contributing approximately 60,000,000 gallons of partially treated sewage to the South Platte River. Plans for doubling the size of the primary treatment equipment have been completed and revenue bonds have been sold for the financing of this construction. These plans include the construction of two new sections of bar screen, one new grit chamber, two new aeration tanks, two clarifiers, two digesters, and one fine screen for final effluent; plans also include the doubling of the present laboratory space. The estimated cost of such construction is $1,750,000. Tentative plans are under way for an additional bond issue to finance the construction of additional primary treatment facilities.

Section V

GENERAL SUMMARY AND CONCLUSIONS

The amount of pollution contributed to the South Platte River and Cherry Creek by industries in the city of Denver is relatively low. The greater part of wastes returned or disposed of in the river is cooling water and the effect is one of temperature rise rather than outright pollution. The most serious types of pollutant found in the river in Denver are oil and grease from railroad roundhouses. Packing plants, for the most part, discharge their waste material into the city sewers and are, therefore, not responsible for any subsequent pollution. The single plant which is now discharging paunch manure into the river will be assisted in corrective measures in the near future.

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* Editorial Note: Since completion of this survey, water pollution from this source has been eliminated. (See page 148, also).

Only two cases of chemical pollution were found and they were not considered to be of a very serious nature. The lime discharged by an acetylene producing plant creates a problem of deposition while the discharge from the other plant actually contains very small amounts of acid.

The remaining pollution material is due to the drain from the city-operated dump and indiscriminate use of drainage ditches and the river as dumps by individuals. The degree of pollution is difficult to estimate, but must be considered in the over-all picture of the problem.

J. Robert Cameron, Chief
General Sanitation Section

By: /s/ Edward W. Conners, Jr.
/t/ Edward W. Conners, Jr.
Junior Engineer

APPENDIX "D"

SAMPLE REPORTS ON TYPICAL WASTES INVESTIGATIONS

I. Industrial Wastes Reports

A. Seed Production Plant
B. Dairy

II. Municipal Sewage Disposal

A. Boulder, Colorado
B. Cheyenne, Wyoming

INSPECTION REPORT - INDUSTRIAL WASTES

1. Type of Plant: Seed washing and drying plant.

2. Name of Plant: John Doe Seed Growers, Inc.

3. Address: "X" St. and "Y" Ave., Greeley, Colorado.

   Location: Outside the city limits of Greeley at Cache la Poudre River.

4. Main Watershed: South Platte River
   Subwatershed: Cache la Poudre
   River Mileage Index: ClP 4.4

5. Contact at Plant: John Doe, Manager.

6. Plant Operation: Seasonal - Usually Sept. 15 to Nov. 1.
   Monday thru Saturday, 8 A.M. to 5 P.M.

7. Raw Materials: Cucumber, squash, and cantaloupes field thrashed for seed recovery.

8. Population Equivalent Computation:

Sewered population equivalent based on B.O.D.	2300
Sewered population equiv. based on suspended solids	920

Factors Used: It appears that the waste would be similar in character to cannery wastes. With this in mind, an estimate 1000 ppm 5-day BOD was applied to the waste volume. This figure is in the neighborhood of the strength of cannery wastes in general. The suspended solids equivalent was figured as 40% of the BOD equivalent as this is about the usual relationship of cannery wastes.

9. Water Supply: Municipal.

   Use: 1949 season (Sept. 15 to Nov. 1) - 1,670,500 gals., or 46,500 gallons per day for 36 working days.

10. Products: Dried seeds (Average Season)

Squash	110,000 lbs.
Cucumbers	20,000 lbs.
Cantaloupe	20,000 lbs.

Seed Washing and Drying (Continued)

11. Process and Sources of Wastes:

The vegetable to be used for seed recovery is allowed to remain in the field until it is in the latter stages of ripening. Thrashers of special construction are brought into the field for the purpose of separating the seeds from the heavier solid parts of the vegetable. Some thrashers have elevators for lifting the windrowed vegetables to the thrasher hopper; others are manually operated as the thrasher is moved through the field.

The hopper of the thrasher feeds to a crusher which consists of two rotating drums with projecting blunt prongs and ridges which break up the vegetable. From the crusher the vegetable falls to a cylindrical screen of approximately 1/2 inch openings. The seeds, small pieces of vegetable, and juice drop through the screen to a sump. Pieces too large to pass the screen fall to the field. The mixture of seeds, juice, and small particles of the vegetable is pumped to a separator.

The separator is an inclined semi-cylindrical screen with a revolving stirrer passing close to the screen. Juice and finer vegetable particles pass through 3/16" perforations of the screen to the ground. The seeds and larger particles are conveyed to the end of the separator where they are collected in sacks.

The sacks of seed are hauled to the seed washing and drying plant, where the thrashed seed is fed first to a washer. The washer is a receiving tank into which fresh water flows continuously. A mechanical stirrer keeps the material in suspension. The water loosens the meat from the seeds. The suspension then flows from the receiving tank to a cylindrical screen. Seeds fall through the screen while the larger pieces of vegetable are retained. The vegetable pieces are collected and piled in a dump nearby. The seeds pass through a water spray wash as the final step.

The washed seeds are sun dried and sacked for marketing.

12. Waste Disposal:

The liquid wastes from the seed washers flow through an open recessed trough in the concrete floor and through tile to a small catch basin. This basin is 3'x6'x3' with a trapped outlet. It is cleaned when necessary. The settled and floating material is placed on the waste pile nearby. The size appears inadequate to accomplish any appreciable removal of suspended matter. Effluent from the basin flows through a 4-inch tile to the Cache la Poudre River.

Inspected by: G. N. McDermott, Sr. Asst. Sanitary Engineer,
U. S. Public Health Service

Date of Inspection: February 22, 1950.

INSPECTION REPORT - INDUSTRIAL WASTES

1. **Type of Plant:** General Dairy

2. **Name of Plant:** John Doe Farms, Inc.

3. **Address:** Denver, Colorado

4. **Main Watershed:** South Platte River
   Subwatershed: Big Dry Creek
   River Mileage Index: BD 1.8

5. **Contact at Plant:** John Doe, General Manager

6. **Plant Operation:** Milking: 200 cows; 6 - 8 A.M. and 6 - 8 P.M.

   Pasteurization, bottling, etc.: 7:00 A.M. to 1:30 P.M.

   Cleanup: 1:30 P.M. - 3:30 P.M.

   Plant Employees: 75 total; 12 live on premises.

7. **Raw Materials:** 26,000 lbs/day of whole milk. Greater portion of milk shipped in from other farms.

8. **Population Equivalent Computation:**

   Sewered Population Equivalent based on B.O.D. 260
   Sewered Population Equiv. based on suspended solids. 130

   Factors used per 1000 lbs. milk intake per day - BOD 10
   -- Suspended Solids 5

9. **Water Supply:** Municipal Water Supply and Deep Well located on property.

   Use: 70,000 gals. per day (estimated by Manager). Water for the stock, washing out barns, and for lawn watering is pumped from Dry Creek.

10. **Products:**
    Pasteurized milk . . . . . . 21,000 lb/day
    Pasteurized cream. . . . . . Unknown
    Cottage Cheese . . . . 125 lb/day from 500 gal. skim milk
    Buttermilk . . . . Unknown

General Dairy (Continued)

11. **Wastes:** Can, bottle, equipment, and floor washings.
Spills.
Washings from milking parlor floor (15 stalls) and concrete floor of feeding barn (125 stall capacity).

12. **Waste Disposal:**

Engineering drawings of septic tanks and leaching fields of recent design were shown the investigator. These tanks are described as follows:

Tank Dimensions	Waste Disposed of through Tank
4' x 8' x 4' operating depth	Creamery and Office.
6' x 12' x 4' operating depth	Bunkhouse and Wash Rooms.

The management stated that these tanks were for the purpose of removing the above wastes from the original disposal system. The old system, which consisted of a septic tank (8'x8'x4' operating depth) and outfall sewer leading to Big Dry Creek, is being used at present for disposal of floor washings from the feeding barns and milking parlor according to Mr. Doe.

The manhole of this old tank and the outfall sewer was shown the investigator. At the time the effluent of this outfall was observed, 12.10 P.M., it was carrying an estimated 25 gpm of milk-colored wastes. That portion of the plant said to be sewered by this outfall, that is the feed barns and milking parlor, was not being washed at the time. The source of these wastes was not readily apparent. The management was unable to explain their origin or to account for their existence.

In view of the uncertainty of the type and quantity of wastes being disposed of through the new septic tank and leaching fields, the wastes may be regarded as being disposed of through the old system.

Inspected by: G. N. McDermott, Sr. Asst. Sanitary Engineer,
U. S. Public Health Service.

Date of Inspection: July 13, 1949.

INSPECTION REPORT - SANITARY SEWAGE

1. **Source of Waste:**	Boulder, Colorado, domestic sewage.
2. **Main Watershed:**	South Platte River
Subwatershed:	St. Vrain Creek.
Branch:	Boulder Creek
3. **Source of Information:**	a. City Engineer Dept. Employee b. Supervising Engineer

4. Source of Sewage and Disposal Methods:

a. Source

Domestic sewage from the developed portion of the city.

b. Disposal Methods

The existing sewage treatment plant consists of the following units:

Grit Chamber.
Comminutor.
Sedimentation Basin - circular 80' diameter, 11'4" depth at periphery, 14'0" depth at center.
Sludge digestion tank - floating cover type, 42'0" diameter, 22'0" depth.
Sludge drying beds, open - 24,000 square feet.

Retention periods in the sedimentation basin for flows 150% of daily maximum are given in the table in Section 5 below.

The sedimentation basin, digester, and drying beds were constructed in 1934. The plant was designed for a population of 16,000 and a maximum sewage flow of 5.6 mgd. The grit chamber was constructed in July of 1949.

The City of Boulder has increased in population considerably in recent years. The estimated 1948 population was 21,363. This figure includes enrollment at the University of Colorado. The figure was arrived at after consideration of increases in utilities, school enrollment, and other factors.

The sewerage of Boulder is subject to considerable infiltration and evidently many down spouts and possibly storm sewers are connected to it as demonstrated by excessive flows during and subsequent to heavy rainstorms.

The treatment plant has been by-passed for considerable periods of time during the past 6 months. By-passing was necessary for inspection of the sedimentation basin, repair of the digester, and construction of a grit chamber. A lagoon of 80,000 cubic feet capacity was constructed for use during the by-passing periods. Effluent from the treatment plant is currently being passed through this lagoon which provided an additional 3 - 5 hours' detention.

5. Quantity of Sanitary Sewage:

The quantity of flow as measured by weir and water stage recorders reached approximate maximum flows during several typical months as shown in the table below.

Month 1948	Maximum daily flow (mgd)	Retention period in sedimentation basin at 150% of flows given in Column (2) (minutes)
July	5.7	76
June	4.5	96
March	3.1	138

6. Population Equivalents:

Sewered population equivalent based on BOD (Allowing 30% reduction for sedimentation and using 21,363 as the population) = 14,900

7. Comments and Additional Information:

None

Inspected by: G. N. McDermott, Sr. Asst. Sanitary Engineer,
U. S. Public Health Service.

W. F. Johnston, Public Health Engineer,
Colorado State Department of Health.

Date of Inspection: September 28, 1949.

INSPECTION REPORT - SANITARY SEWAGE

1. **Source of Waste:** Cheyenne, Wyoming - domestic sewage.

2. **Main Watershed:** South Platte River
   Subwatershed: Crow Creek
   River Mileage Index: Cr 76.3

3. **Source of Information:**

   a. Cheyenne Public Health Department.
   b. Report on Sewage Disposal by Black and Veatch, Consulting Engineers, 4706 Broadway, Kansas City, Missouri, dated January 6, 1947.

4. **Description of Source of Waste and Disposal Methods:**

Cheyenne has separate systems of sewers for storm drainage and for sanitary sewage. Coverage of developed properties, as far as sewerage is concerned, is quite complete. Significant industrial wastes contributed to the city sewerage are those of a Packing Company and a Railroad (shops, roundhouse, and train service center). The remaining significant industry contributing pollution at Cheyenne, a Refining Company, operates its own waste disposal system. These industrial wastes are covered in separate reports. The estimated contributing population was approximately 31,000 at the end of 1946. This figure does not include the contributing population from Fort Warren or from the Veterans Administration Hospital. The figure was indicated by the use of utilities and by school enrollment. The Fort sanitary engineer estimated the contributing population of the Fort to the Cheyenne sewerage system as 4,000 at the date of this report. The resident population of the Veterans Hospital at Cheyenne is approximately 250.

The main section of the city is sewered by a 27" main sewer which discharges into an irrigation ditch at the foot of South First Street. Three sewer lines which serve the permanent post at Fort Warren enter this district from the West and are tributary to the 27" sewer. The irrigation ditch has an outlet, some 400 feet below the sewer outfall, through which the sewage enters Crow Creek when not used for irrigation. The greater part of the remaining developed area of the city is served by an 18" main sewer which discharges into the irrigation canal at the foot of Rawlins Avenue.

The extreme eastern part of the city is contributory to the sewer which serves the Veterans Hospital and which discharges into the irrigation canal near the east line of Section 4. During the greater portion of the time, the sewerage is diverted from the irrigation canal to Crow Creek. A dam across the creek about 3 miles below the city forms an artificial lake with a surface area of approximately 200 acres. The character of the sanitary sewage, as determined by the consulting engineers preparing the report referred to above, is given in the following

Cheyenne, Wyoming Domestic Sewage (Continued).

table:

Characteristics	Sewer on First St.	Sewer on Rawlins St.
pH	7.8	7.8
B.O.D.	190.0	360.0
Suspended Solids	220 0	230.0
Note: The Packing Company was not operating at the time the samples were collected.		

5. Quantity of Sanitary Sewage:

The following information is contained in the Engineering Report referred to above: Measurements of sewage flow on First Street and Rawlins Avenue indicated an average sewage flow of 5.26 mgd. It was estimated that the sewers serving the East portion of the City of Cheyenne and the Veterans Administration Hospital carried .06 mgd. These measurements did not include the wastes of the Packing Plant. The wastes of the packing company as determined by metered water use for the month of June 1949 amounted to an average of 0.03 mgd. The portion of these wastes originating with the Railroad was unknown. Total water consumption of the Railroad for the year 1947 averaged 1.8 mgd. A certain portion of this water use was consumptive and it is believed that at least some of this Railroad's wastes entered a storm sewer which flows to Crow Creek at the end of Evans Avenue.

6. Population Equivalent:

Sewered population equivalent based on BOD (Estimated population contributing - 35,000. No industrial waste included) 35,000

Sewered population equivalent based on suspended solids (Estimated population contributing - 35,000. No industrial waste included). 35,000

7. Comments and Additional Information:

It is planned to determine more fully the nature and disposition of the wastes of the Railroad Company. This information will be contained in a separate report.

Inspected by: G. N. McDermott, Sr. Asst. Sanitary Engineer,
U. S. Public Health Service.

Date of Inspection: August 3, 1949.

APPENDIX "E"

STATE WATER POLLUTION CONTROL LEGISLATION

Suggested State Water Pollution Control Act and Explanatory Statement*

Introduction

A sanitary environment is the first element of a comprehensive national plan for a healthier America. To produce a sanitary environment we must develop clean waters through the prevention and abatement of pollution.

Adequate State legislation is one of the principal means for ensuring the success of pollution control programs throughout the United States. The most carefully prepared laws, however, cannot solve the water pollution problem unless they are supported by an informed public.

In adopting the Water Pollution Control Act of 1948 (Public Law 845, 80th Congress), the Congress acted not only to recognize, preserve, and protect the primary responsibilities and rights of the States in producing clean waters, but also encouraged the enactment of uniform State laws as a means toward the attainment of this objective.

An earlier draft of the suggested State Water Pollution Control Act was reviewed by more than 800 individuals and organizations representative of all the water users in the United States. Later, a committee of consultants, representing the State water pollution control authorities and State officials having a broad background in legislative procedure, evaluated the draft and the comments received. The draft which is now suggested reflects in large measure the views of these individuals.

The Council of State Governments has endorsed this "Suggested State Water Pollution Control Act" and recommends it to the States for favorable consideration. For many years, the State legislation on water pollution control has been gradually progressing toward uniformity. The Public Health Service hopes that the suggested Act will facilitate this evolutionary process.

LEONARD A. SCHEELE
Surgeon General.

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* Federal Security Agency, Public Health Service, Division of Water Pollution Control; October, 1950. (Public Health Service Publication No. 49).

Contents

Page

Explanatory Statement 263
  Pollution 264
  Type of Administrative Agency 265
  Classification of Waters - Standards of Water Quality 266
  Permits 266
  Enforcement 266
  Administrative Powers 267

Suggested State Water Pollution Control Act 268
  Statement of Policy 268
  Definitions 268
  Creation and Organization of Board; Meetings; Employees 268-A
  (Alternative Section) Creation and Organization of Agency and Advisory Board; Meetings; Employees 268-D
  Powers and Duties 268-E
  Prohibitions 268-G
  Classification of Waters; Standards of Water Quality 268-G
  Proceedings before Board 268-H
  Hearings 268-J
  Inspections and Investigations; Maintenance of Records 268-J
  Penalties; Injunctions 268-K
  Review 268-L
  Conflicting Laws 268-M
  Existing Rights and Remedies Preserved 268-M
  Severability 268-N
  Short Title 268-N

The "Suggested State Water Pollution Control Act" has been endorsed by the Council of State Governments and recommended to the States in the Council's "Suggested State Legislation; Program for 1951" issued in November, 1950

Explanatory Statement

Increasing interest in development and conservation of our country's water resources has been reflected in the concern which legislatures have shown with the problem of water pollution. Within the last decade more than half the States have adopted new legislation in this field or strengthened existing laws, and in 1948 the Congress passed the Water Pollution Control Act, the first attempt by the Federal Government to join with the States in a comprehensive attack on the problem as a whole. A "Suggested State Water Pollution Control Act" has been prepared as a part of this effort.

The underlying concept and purpose of this legislation is to facilitate interstate co-operation for a more concerted attack on water pollution. Many benefits would be derived if the States adopted legislation uniform in basic principles. It is not expected that the States will repeal their existing legislation and adopt this suggested law. The process of obtaining uniformity is one of evolution. It is suggested that the States take a realistic look at their basic statutes in the field of water pollution control and compare them with the suggested law. Those familiar with State law in this field will find little that is new in the suggested draft. Basically, what has been done has been to adopt the best practices from existing State statutes and using these as a framework to develop a statute that could aid and strengthen the State programs.

A preliminary draft of the "Suggested Act" was submitted for comment to a large number of State sanitary engineers; lawyers; conservationists; industrialists; sportsmen's, wildlife and conservation, agricultural and recreational groups; national lay organizations; municipal organizations; and other persons interested in this field. Subsequently, the preliminary draft, together with comment which was received from all parts of the country, was considered and discussed by a board of expert consultants meeting in Washington. The "Suggested Act" was prepared and revised in light of comments and suggestions resulting from the foregoing procedures.

State water pollution control legislation developed traditionally out of the authority of health departments to preserve public health. In conjunction with this there was piecemeal lodging of concurrent water pollution control authority in several other departments of State governments such as those dealing with agriculture, fish and wildlife, and mines and minerals which also had an interest in water pollution control. The modern approach to the problem is reflected in recent State statutes whose object is to preserve and improve water quality for all legitimate uses and do this through an agency that represents all affected interests in the State. Accompanying this has been a shifting emphasis from the mere abatement of existing pollution to the policy of preventing pollution in its incipiency.

In the early statutes the administrative approach was largely negative in character. That is, when a particular action was found to cause pollution the administrative agency was authorized to take steps to abate such pollution. The Suggested State Water Pollution Control Act follows the more recent statutes by authorizing the agency to develop a comprehensive program to deal with the problem in all waters of the State. Under this approach, the agency, having determined permissive limits of waste discharges into the waters of the State, uses its enforcement procedure to abate existing pollution and restore the quality of polluted waters, while through a system of permits it prevents any increase in waste discharges which would impair desired water uses.

The Act is designed to give the agency broad discretion in administration of the program and makes its jurisdiction complete over all waters of the State. It avoids such restrictive practices as exemption of particular industries or geographic areas and legislative classification of particular streams for specified water uses.

While the Act is complete in itself, it rests on a framework of other State statutory and constitutional provisions. Perhaps one of the most important of these relates to municipal financing. No water pollution control program can operate successfully unless the State and its political subdivisions can finance the construction and operation of remedial works for treatment of wastes. The Suggested State Water Pollution Control Act does not treat this subject in view of its complexity and the numerous individual problems peculiar to particular States. Reference is made to the Council of State Governments' 1949 program of suggested State legislation for ~~a~~general approach to the problem and suggestions for individual States.

While a section-by-section analysis of the Act will not be attempted, some comments may be directed to its principal features.

Pollution - The most important definition in the Act is the definition of "pollution," which is designed to protect all legitimate uses of waters of the State. To this end, "pollution" as defined includes both discharges of wastes actually or potentially harmful to such uses and also altering the properties of the waters in such a way as to be harmful. The latter, for example, would cover heating of water in such a way as to deplete oxygen supply and reduce the capacity of the water to support fish life or stabilize discharges of wastes. This definition must be read together with subsequent sections of the Act authorizing the classification of waters and the setting of standards of water quality. Discharges which violate such standards and classifications are declared unlawful, but discharges consistent with them are not considered "pollution" for purposes of the Act. The Act, therefore, gives effect to the agency's action in classifying waters and setting standards but does not hold its enforcement powers in abeyance until such action can be completed.

Type of Administrative Agency - One of the most important questions for any State to decide in preparing water pollution control legislation is the agency to which enforcement of the program will be entrusted. As has been said, most early legislation of this type vested authority in the State health department. The problems of water pollution control, however, concern other interests than health, and in a broader sense are an integral part of the problem of preserving the water resources of the State. For example, wildlife and conservation interests, industry, municipalities and agriculture have a stake in the enforcement of a water pollution control program. It is believed important that any agency which is set up to administer such a program should be so constituted as to take into account the interests and views of these and other affected groups in addition to health considerations.

Most States which have recently enacted water pollution control legislation have entrusted its enforcement to a board representative of the interests considered to be affected. Such boards are sometimes made up of representatives of various departments of the State government, sometimes of citizens from outside the government, and more frequently of a combination of the two. Adoption of this form has the advantage of facilitating representation of affected interests in the agency. If it is adopted, provision should also be made for an executive secretary to serve as the administrator of the program and to carry out the policies adopted by the board. Some States may wish to vest responsibility for the program in a single administrator. If this is done, it would seem advisable to secure representation of affected interests through an advisory council, and it may also be considered desirable to set up a board of review to hear appeals from the single administrator's decisions.

The Suggested State Water Pollution Control Act has incorporated alternative provisions covering both the board and the single administrator type of agency.

States adopting water pollution control legislation recently have in some cases set up completely independent agencies, but have more frequently placed the agency within an existing State department, generally the department of health. This is a matter for determination by each individual State. Where the agency is set up within an existing State department, however, it is believed desirable to vest it with authority to act independently since an agency representing so broad a field of the State interests should not be subjected to the supervisory control of any single State department which operates in a comparatively narrower field.

Where the agency is established in an existing State department it is recommended that it be placed in the State health department. Not only is health a major public interest and an integral part of an active water pollution control program, but also the health department usually has trained personnel and facilities which may be utilized for work in connection with the water pollution control program. It will usually be true that the health department is already carrying on some of the functions which this Act vests in the new agency. Use of health department personnel and facilities therefore will avoid unnecessary duplication of functions.

Classification of Waters - Standards of Water Quality - Some agencies in the administration of water pollution control programs have classified the waters of the State according to their use and have established standards of quality for such waters in accordance with their respective uses. Proponents of this method have urged that classification and setting of standards is an essential element of any comprehensive program and also that no enforcement action can be undertaken without determination of the use to which a particular body of water should be put and the degree of quality which the water must have in order to be suitable for such use. This approach, however, has been severely criticized by others who maintain that the process is administratively difficult and time-consuming, that classifications once made are hard to change and tend to create vested interests, and that the tendency will be to reduce waters to the level of mere carriers of wastes because of the pressure of special interests.

The Suggested State Water Pollution Control Act authorizes the agency to classify waters and set up standards of quality for water falling within particular qualifications but does not make it mandatory to do so. Classifications and standards once promulgated have a definite legal effect and their violation is made unlawful; conversely, discharges which comply with such classifications and standards are not pollution within the meaning of this Act. In view of the number of persons affected by classifications and standards, it is required that their adoption be preceded by a public hearing open to all residents of the areas affected, and that adequate notice thereof be given. The Act provides that in classifying waters and setting standards the agency will be guided by the the principle of constantly seeking to improve water quality and upgrading streams for progressively higher uses to the maximum extent practicable.

Permits - Potentially one of the most effective techniques for control of water pollution is a permit system, under which discharges of wastes into any waters of the State are prohibited except as permitted by the agency after examination of plans, specifications and other data. Through this means the agency can either prohibit discharges altogether or condition their approval on treatment adequate to protect legitimate water uses. The Act contains broad provisions authorizing the agency to require permits for waste discharges and additions to plants which would result in increased pollution. Normally, the permit system would be restricted to new pollution or increases in existing waste discharges, but the breadth of the language employed is sufficient to enable the agency to extend the requirement to existing discharges where this is considered desirable administratively.

Enforcement - The Act affords a variety of methods for proceeding against any alleged polluter. It is made unlawful to cause any pollution of the waters of the State or to violate any order issued by the agency, including an order establishing a classification of waters or standards of water quality. Pollution of waters of the State is declared to be a public nuisance and is therefore subject to abatement in accordance with State practice for abatement of nuisances. Violation of the provisions of the Act or any order or determination by the agency or failure to perform any duty imposed by the Act is declared to be a misdemeanor. In addition, the Attorney General has the duty to bring an action for an injunction against any person violating any provision of the Act or any order of the agency. The principal method of making the program effective through compulsory process, however, is by administrative action. The agency is empowered to issue orders against alleged polluters after adequate opportunity for hearing. Such orders if not appealed to the courts become final and are enforceable in much the same way as the judgment of a court. The same administrative hearing procedure is employed in cases of revocation, denial or modification of permits.

Appeals may be taken to the courts from orders of the agency. Such appeals do not involve trial de novo but are primarily reviews of the legal propriety of the agency's decision. If the prescribed statutory procedure has been followed and the determination is supported by substantial evidence, the order of the agency will be affirmed by the court.

It is recognized that the provisions of the Act for administrative hearings and judicial review will not be appropriate in all cases. Each State will necessarily adapt them to their own administrative and judicial practice and existing statutes. The provisions of the Act, however, embody principles which are believed desirable in this type of legislation.

Administrative Powers - The Act confers on the agency the requisite administrative powers to carry out its responsibilities. Thus, the agency is empowered to hold hearings, subpoena witnesses, enforce its subpoenas, administer oaths, examine plans and specifications, require the keeping of records and the making of reports, and enter on property at reasonable times for purposes of inspection and investigation.

Suggested State Water Pollution Control Act

(Title. It should conform to State requirements. The following is a suggestion; a more complete title should be used where necessary).

"AN ACT to establish a State water pollution control agency, and to control, prevent and abate pollution of the surface and underground waters of the State."

(Be it enacted, etc.)

Section 1. Statement of Policy.[1] Whereas the pollution of the waters of this State constitute a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life, and impairs domestic, agricultural, industrial,[2] recreational and other legitimate beneficial uses of water, and whereas the problem of water pollution in this State is closely related to the problem of water pollution in adjoining States, it is hereby declared to be the public policy of this State to conserve the waters of the State and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to provide that no waste be discharged into any waters of the State without first being given the degree of treatment necessary to protect the legitimate beneficial uses of such waters; to provide for the prevention, abatement and control of new or existing water pollution; and to co-operate with other agencies of the State, agencies of other States and the Federal Government in carrying out these objectives.

Section 2. Definitions. For the purposes of this Act, the following words and phrases shall have the meanings ascribed to them in this section.

(a) "Pollution" means such contamination, or other alteration of the physical, chemical or biological properties, of any waters of the State, or such discharge of any liquid, gaseous or solid substance into any waters of the State as will or is likely to create a nuisance or render such waters harmful or detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

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[1] Where a State has committed itself to a general water resources program, a declaration to the effect that water pollution control is an integral part of such program should be added.
States in the West and Southwest may want to add a statement to the effect that water pollution control is basically a water conservation program in their States.

[2] Specific wastes which are of particular interest to an individual State may be included, such as mine wastes, etc.

(b) "Wastes" means sewage, industrial waste and all other liquid, gaseous or solid substances which may pollute or tend to pollute any waters of the State.

(c) "Sewerage system" means pipe lines or conduits, pumping stations, and force mains, and all other constructions, devices, appurtenances and facilities used for collecting or conducting wastes to a point of ultimate disposal.

(d) "Treatment works" means any plant, disposal field, lagoon, dam, pumping station, incinerator, or other works used for the purpose of treating, stabilizing or holding wastes.

(e) "Disposal system" means a system for disposing of wastes, and includes sewerage systems and treatment works.

(f) "Waters of the State" means all streams, 3/ lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow through, or border upon this State or any portion thereof.

(g) "Person" means the State, any municipality, political subdivision, institution, public or private corporation, individual, partnership, or other entity.

Section 3. Creation and Organization of Board; Meetings; Employees. There is hereby created and established 4/ a State water pollution control board hereinafter referred to as the "Board" which shall

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3/ Seaboard States should include within this definition such coastal waters as are within the jurisdiction of the State.

4/ The State water pollution control authority may be set up as an independent board or may be established within an existing State department. Regardless of where the Board is placed, it is important that the statutory authority flow directly to it and that it have independent powers of operation.

In cases where the board is placed in an existing State department, it is suggested that it be placed within the State health department because of the close connection between the work of the State health be composed of _____ members as follows: The Director of the Department of Health; the Director of the Department of Agriculture; The Director of the Department of Conservation, Fish and Game; and two members appointed for terms of _____ years by the Governor. One of the members appointed by the Governor shall be experienced in the field of municipal government and one shall be experienced in the field of industrial activities. 5/ The Board is directed to carry out the functions and duties conferred on it by this Act.

Each ex-officio member of the Board may, by official order filed in his respective department, designate a deputy in his department to perform the duties of the member making the designation. Such persons, if any, designated pursuant to this section, shall have the powers and be subject to the duties and responsibilities of the officer appointing him. 6/

No additional compensation shall be allowed any member of the Board 7/ for services rendered in that capacity. Actual and necessary travel and other expenses incurred by members in the discharge of their official duties as members of the Board shall be paid out of any funds which are or may become available for the purposes of this Act.

The Board shall organize and annually select one of its members to serve as chairman and one of its members to serve as vice-chairman, shall hold at least four regular meetings each calendar year and shall

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4/ (Cont'd.)
department and water pollution control activities. Further, State health departments in most cases are already active in the field of water pollution control and have trained technical staffs working on pollution control problems.

The "Suggested State Water Pollution Control Act" may be adapted to the placing of water pollution control authority within the State health department by inserting the words "in the State health department" after the word "established;" virtually no other change will be necessary.

5/ This list of members of the Board is suggestive only and is not meant to be inclusive. The membership of the Board will necessarily vary from State to State. In addition to those mentioned above, some States may desire to place members on the Board for specified terms who are representatives of such fields as public affairs, recreational and resort interests, and broad water resources activities.

6/ It may be necessary in some States also to provide that: "Such designation shall be deemed temporary only and shall not affect the civil service or retirement rights of any person so designated."

7/ In States where it is customary to provide an honorarium for members of State Boards and Commissions, similar allowances should be made for those members of the State water pollution control board who are not serving in an ex-officio capacity.

keep a record of its proceedings which shall be open to the public for inspection. Special meetings may be called by the chairman, and must be called by him upon receipt of a written request therefor signed by two or more members of the Board. Written notice of the time and place of each meeting shall be delivered to the office of each member of the Board and the executive secretary. A majority of the members of the Board shall constitute a quorum.

The Board shall appoint an executive secretary [8] who shall direct and carry out all water pollution control activities vested in the Board. Such executive secretary shall be a person fully trained and experienced in the field of water pollution control and if the Board so desires, may be a present employee of the State government. The executive secretary in the interim between meetings of the Board shall have authority to perform in the name of the Board all functions and duties of the Board except the authority to adopt and promulgate standards, rules and regulations; classify streams; revoke permits; and issue or modify orders.

The Board may employ, compensate, and prescribe the powers and duties of such officers, employees, and consultants, in accordance with the laws of this State, as may be necessary to carry out the provisions of this Act. However, technical, legal or other services shall be performed, insofar as practicable, by personnel of the department of health and by other State departments, agencies, and offices.

The Board may delegate to the executive secretary, officers, employees, and consultants of the Board such functions and duties as are vested in the Board by this Act, except the authority to adopt and promulgate standards, rules and regulations; classify waters; revoke permits; and issue or modify orders.

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[8] It may be necessary to include a statutory provision for the salary of the executive secretary, if the State statutes do not provide an over-all compensation system for State officials.

((Alternative Section 3))

Section 3. Creation and Organization of Agency and Advisory Board; Meetings, Employees.

(a) There is hereby created and established 9/ a State water pollution control agency 10/ hereinafter referred to as the "Agency."

(b) The Governor shall appoint an administrator who shall be the head of the Agency, shall perform all functions and duties given to the Agency under this Act, and shall direct and carry out all water pollution control activities vested in the Agency. 11/ Such administrator shall be a person fully trained and experienced in the field of water pollution control and if the Agency so desires may be a present employee of the State government.

(c) The Agency may employ, compensate, and prescribe the powers and duties of such officers, employees, and consultants in accordance with the laws of the State as may be necessary to carry out the provisions of this Act. However, technical, legal or other services shall be performed, insofar as practicable, by personnel of the department of health and by other State departments, agencies, and offices.

9/ The State water pollution control authority may be set up as an independent Agency or may be established within an existing State department. Regardless of where the Agency is placed, it is important that the statutory authority flow directly to it and that it have independent powers of operation.

In cases where the Agency is placed within an existing State department, it is suggested that it be placed within the State health department because of the close connection betweenthe work of the State health department and water pollution control activities. Further, State health departments, in most cases, are already active in the field of water pollution control and have trained technical staffs working on the problem.

The "Suggested State Water Pollution Control Act" may be adapted to the placing of water pollution control authority within the State health department by inserting the words "in the State health department" after the word "established"; virtually no other change will be necessary.

10/ It may be desirable to modify this type of Agency by making provision for a Review Board to review the final orders of the single administator.

11/ It may be necessary to include a statutory provision for the salary of the administrator, if the State statutes do not provide an over-all compensation system for State officials.

(d) The Administrator may delegate to the executive secretary, officers, employees, and consultants of the Agency such functions and duties as are vested in the Agency by this Act, except the authority to adopt and promulgate standards, rules and regulations; classify waters; revoke permits; and issue or modify orders.

(e) There is hereby established within the Agency a State Water Pollution Control Advisory Board consisting of _____ members. Such members are to be appointed by the Governor for terms of _____ years or until successors shall be appointed or qualified, 12/ and shall consist of the Administrator of the State water pollution control agency who shall be chairman, and persons experienced in the fields of public health; agriculture; conservation, fish and wildlife; political subdivisions; and industrial activities. 13/ The Water Pollution Control Advisory Board shall hold at least two regular meetings each calendar year. It shall be the duty of the Board to review the policies and program of the State water pollution control agency as developed under authority of this Act and to make recommendations thereon to the Administrator of the Agency.

No compensation shall be allowed any members of the Board 14/ for services rendered in that capacity; however, actual and necessary travel and other expenses incurred by members in the discharge of their official duties as members of the Agency shall be paid out of any funds which are or may become available for the purposes of this Act.

Section 4. Powers and Duties. The Board 15/ shall have and may exercise the following powers and duties:

(a) To develop comprehensive programs for the prevention, control and abatement of new or existing pollution of the waters of the State;

12/ Provision should be made for overlapping terms of office for the members of the Advisory Board.

13/ This list of members of the Advisory Board is suggestive only and is not to be deemed to be inclusive. The membership of the Board will necessarily vary from State to State and may include ex-officio members.

14/ In States where it is customary to provide an honorarium for members of State Boards and Commissions, similar allowances should be made for those members of the State Water Pollution Control Advisory Board who are not serving in an ex-officio capacity.

15/ The word "Board" is used throughout subsequent sections of the Act. Where alternative section 3 is selected, the word "Board" should be changed to "Agency."

(b) To advise, consult, and co-operate with other agencies of the State, the Federal Government, other States and interstate agencies, and with affected groups, political subdivisions, and industries in furtherance of the purposes of this Act;

(c) To accept and administer loans and grants from the Federal Government and from other sources, public or private, for carrying out any of its functions;

(d) To encourage, participate in, or conduct studies, investigations, research and demonstrations relating to water pollution and causes, prevention, control, and abatement thereof as it may deem advisable and necessary for the discharge of its duties under this Act;

(e) To collect and disseminate information relating to water pollution and the prevention, control and abatement thereof;

(f) To adopt, modify or repeal and promulgate standards of quality of the waters of the State and classify such waters according to their best uses in the interest of the public under such conditions as the Board may prescribe for the prevention, control and abatement of pollution.

(g) To adopt, modify, repeal, promulgate and enforce rules and regulations implementing or effectuating the powers and duties of the Board under this Act;

(h) To issue, modify or revoke orders (1) prohibiting or abating discharges of wastes into the waters of the State; (2) requiring the construction of new disposal systems or any parts thereof or the modification, extension or alteration of existing disposal systems or any parts thereof, or the adoption of other remedial measures to prevent, control or abate pollution; and (3) setting standards of water quality, classifying waters or evidencing any other determination by the Board under this Act;

(i) To review plans, specifications or other data relative to disposal systems or any part thereof in connection with the issuance of such permits as are required by this Act;

(j) To issue, continue in effect, revoke, modify or deny, under such conditions as it may prescribe, to prevent, control or abate pollution, permits for the discharge of wastes into the waters of the State, and for the installation, modification or operation of disposal systems or any parts thereof;

(k) To exercise all incidental powers necessary to carry out the purposes of this Act.

Section 5. Prohibitions.

(a) It shall be unlawful for any person to cause pollution as defined in section 2 (a) of this Act of any waters of the State or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any waters of the State. Any such action is hereby declared to be a public nuisance.

(b) It shall be unlawful for any person to carry on any of the following activities without first securing such permit 16/ from the Board, as is required by it, for the disposal of all wastes which are or may be discharged thereby into the waters of the State: (1) the construction, installation, modification or operation of any disposal system or part thereof or any extension or addition thereto; (2) the increase in volume or strength of any wastes in excess of the permissive discharges specified under any existing permit; (3) the construction, installation, or operation of any industrial or commercial establishment 17/ or any extension or modification thereof or addition thereto, the operation of which would cause an increase in the discharge of wastes into the waters of the State or would otherwise alter the physical, chemical or biological properties of any waters of the State in any manner not already lawfully authorized; (4) the construction or use of any new outlet for the discharge of any wastes into the waters of the State.

The Board under such conditions as it may prescribe, may require the submission of such plans, specifications and other information as it deems relevant in connection with the issuance of such permits.

Section 6. Classification of Waters; Standards of Water Quality.

(a) In order to effectuate a comprehensive program for the prevention, control and abatement of pollution of the waters of the State, the Board is authorized to group such waters into classes according to

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16/ Some States may wish to validate by statute permits or approval of plans and specifications presently in effect which have been issued by competent State authorities such as the department of health.

17/ Western and Southwestern States should include the construction, installation, modification or operation of irrigation projects.

their present and future best uses for the purpose of progressively improving the quality of such waters and upgrading them from time to time by reclassifying them, to the maximum extent that is practical and in the public interest. Standards of quality for each such classification consistent with best present and future use of such waters may be adopted by the Board and from time to time modified or changed. 18/

(b) Prior to classifying waters or setting standards or modifying or repealing such classifications or standards the Board shall conduct public hearings in connection therewith. Notice of public hearing for the consideration, adoption or amendment of the classification of waters and standards of purity and quality thereof shall specify the waters concerning which a classification is sought to be made or for which standards are sought to be adopted and the time, date, and place of such hearing. Such notice shall be published at least twice in a newspaper of general circulation in the area affected and shall be mailed at least twenty days before such public hearing to the chief executive of each political subdivision of the area affected and may be mailed to such other persons as the Board has reason to believe may be affected by such classification and the setting of such standards.

(c) The adoption of standards of quality of the waters of the State and classification of such waters or any modification or change thereof shall be effectuated by an order of the Board which shall be published in a newspaper of general circulation in the area affected. In classifying waters and setting standards of water quality or making any modification or change thereof, the Board shall announce a reasonable time for persons discharging wastes into the waters of the State to comply with such classification or standards, unless such discharges create an actual or potential hazard to public health.

Any discharge in accord with such classification or standards shall not be deemed to be pollution for the purposes of this Act.

Section 7. Proceedings before Board.

(a) Whenever the Board determines there are reasonable grounds to believe that there has been a violation of any of the provisions of this Act or of any order of the Board, it may give written notice to the alleged violator or violators specifying the causes of complaint. Such notice shall require that the matters complained of be corrected or that the alleged violator appear before the Board at a time and place

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18/ States which adhere to the "prior acquisition doctrine" should take cognizance of the effect that classification will have on water rights established under other laws.

specified in the notice and answer the charges complained of. The notice shall be delivered to the alleged violator or violators in accordance with the provisions of subsection (e) of this section not less than _____ days before the time set for the hearing.

(b) The Board shall afford an opportunity for a fair hearing in accordance with the provisions of section 8 to the alleged violator or violators at the time and place specified in the notice or any modification thereof. On the basis of the evidence produced at the hearing the Board shall make findings of fact and conclusions of law and enter such order as in its opinion will best further the purposes of this Act and shall give written notice of such order to the alleged violator and to such other persons as shall have appeared at the hearing and made written request for notice of the order. If the hearing is held before any person other than the Board itself, such person shall transmit the record of the hearing together with recommendations for findings of fact and conclusions of law to the Board which shall thereupon enter its order on the basis of such record and recommendations. The order of the Board shall become final and binding on all parties unless appealed to the courts as provided in section 11 within _____ days after notice has been sent to the parties.

(c) Any person who is denied a permit by the Board or who has such permit revoked or modified shall be afforded an opportunity for a hearing in connection therewith upon written application within _____ days after receipt of notice from the Board of such denial, revocation or modification.

(d) Whenever the Board finds that an emergency exists requiring immediate action to protect the public health or welfare, it may without notice or hearing issue an order reciting the existence of such an emergency and requiring that such action be taken as it deems necessary to meet the emergency. Notwithstanding the provisions of subsection (b) of this section such order shall be effective immediately. Any person to whom such order is directed shall comply therewith immediately but on application to the Board shall be afforded a hearing as soon as possible. On the basis of such hearing the Board shall continue such order in effect, revoke it or modify it.

(e) Except as otherwise expressly provided, any notice, order, or other instrument issued by or under authority of the Board may be served on any person affected thereby personally or by publication, and proof of such service may be made in like manner as in case of service of a summons in a civil action, such proof to be filed in the office of the Board; or such service may be made by mailing a copy of the notice, order, or other instrument by registered mail, directed to the person affected at his last known post office address as shown by the files or records of the Board, and proof thereof may be made by the affidavit of the person who did the mailing, filed in the office of the Board.

Every certificate or affidavit of service made and filed as herein provided shall be prima-facie evidence of the facts therein stated, and a certified copy thereof shall have like force and effect. [19]

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[19] Where not otherwise covered by general provisions of State statutes applicable to all administrative agencies, consideration should be

Section 8. Hearings. The hearings herein provided may be conducted by the Board itself at a regular or special meeting of the Board, or the Board may designate hearing officers who shall have the power and authority to conduct such hearings in the name of the Board at any time and place. A record or summary of the proceedings of such hearings shall be taken and filed with the Board, together with findings of fact and conclusions of law made by the Board. In any such hearing a member of the Board or a hearing officer designated by it shall have the power to administer oaths, examine witnesses and issue in the name of the Board notice of the hearings or subpoenas requiring the testimony of witnesses and the production of evidence relevant to any matter involved in such hearing. Witnesses who are subpoenaed shall receive the same fees and mileage as in civil actions. In case of contumacy or refusal to obey a notice of hearing or subpoena issued under this section, the ________________ court shall have jurisdiction upon application of the Board or its representative, to issue an order requiring such person to appear and testify or produce evidence as the case may require and any failure to obey such order of the court may be punished by such court as contempt thereof.

Section 9. Inspections and Investigations; Maintenance of Records. The Board or its duly authorized representative shall have the power to enter at reasonable times upon any private or public property for the purpose of inspecting and investigating conditions relating to pollution or the possible pollution of any waters of the State.

Any authorized representative of the Board may examine any records or memoranda pertaining to the operation of disposal systems. The Board may require the maintenance of records relating to the operation of disposal systems. Copies of such records must be submitted to the Board on request.

19/ (Cont'd.)

given to covering the following points in the "Suggested Act":

(1) Filing or recording the regulations and orders of the State agency with a designated official;

(2) Making such filing and recording prima-facie evidence that all requirements of law have been complied with;

(3) Requiring all courts to take judicial notice of regulations and orders when filed or recorded as prescribed;

(4) Certifying copies.

Section 10. Penalties; 20/ Injunctions.

(a) Any person 21/ who shall violate any of the provisions of, or who fails to perform any duty imposed by, this Act or who violates any order or determination of the Board promulgated pursuant to this

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20/ A number of States provide by statute for penalties, additional to those outlined in section 10, for persons killing fish by polluting the waters of the State. Such a provision appears logical and desirable, since the pollution has, in effect, destroyed property of the State and the person responsible should be liable to pay damages therefor. Such provision has not been included in this "Suggested Act," however, since it is considered more appropriate for inclusion in the conservation laws of the State. If the State wishes to include it in this Act, the following language may be employed:

> "(c) Any person who violates any of the provisions of, or fails to perform any duty imposed by, this Act, or who violates an order or other determination of the Board promulgated pursuant to this Act, and causes the death of fish or other wildlife shall, in addition to the penalties provided in subsections (a) and (b) be liable to pay to the State an additional amount equal to the sum of money reasonably necessary to restock such waters or replenish such wildlife as determined by the Board after consultation with the fish and game commission. Such amount may be recovered by the Board on behalf of the State in a civil action brought in the ________ court."

21/ Where the order is directed against a municipality, the responsible municipal officials would have responsibility for taking steps to comply with it. To enable them to take the necessary action, there must be adequate statutory provision for financing such action by the municipality. Issuance of revenue bonds is a method of financing which has received increasingly broad acceptance in recent years. In those States where such issuance is contingent on a vote of the electors of the municipality, enforcement of the Act would be facilitated by a provision waiving the necessity of such a vote in the case of revenue bonds issued to finance the cost of complying with a final order abating pollution. It is believed that the requirement of such a vote is not appropriate where the legal obligation to construct a treatment works or take other remedial action has been established under a statute.

Act shall be guilty of a misdemeanor 22/ and in addition thereto may be enjoined from continuing such violation. Each day upon which such violation occurs shall constitute a separate violation.

(b) It shall be the duty of the Attorney General on the request of the Board to bring an action for an injunction against any person violating the provisions of this Act, or violating any order or determination of the Board. In any action for an injunction brought pursuant to this section, any findings of the Board after hearing or due notice shall be prima-facie evidence of the fact or facts found therein.

Section 11. Review. 23/

(a) An appeal may be taken from any final order or other final determination of the Board, by any person who is or may be adversely affected thereby, or by the Attorney General on behalf of the State to the __________ court of the State of the area affected or to the __________ court of (seat of Government). Within 30 days after receipt of a copy of the order, or other final determination, or after service of notice thereof by registered mail, the appellant or his attorney shall serve a notice of appeal on the Agency through its ((executive secretary)) or ((Administrator)) provided that during such 30-day period the court may for good cause shown extend such time for not exceeding an additional 60 days. The notice of appeal shall refer to the action of the Board appealed from, shall specify the grounds of appeal, including both points of law and fact which are asserted or questioned by the appellant. A copy of the original notice of appeal with proof of service shall be filed by the appellant or his attorney with the clerk of the court within ten days of the service of the notice and thereupon the court shall have jurisdiction of the appeal.

22/ If the penalty provided for misdemeanors by general statutes is considered insufficient, the State may wish to strike out the balance of the sentence after "misdemeanor" and substitute the following:

> "and upon conviction thereof shall be punished by a fine of not more than $_______ or by imprisonment for a term of not more than one year or by both such fine and imprisonment. In addition thereto such person may be enjoined from continuing such violation."

23/ The above appeal procedure is suggestive only. In any particular State such procedure will necessarily be adapted to the existing judicial structure and practice.

(b) The appellant and the Board shall in all cases be deemed the original parties to an appeal. The State through the Attorney General or any other person affected may become a party by intervention as in a civil action upon showing cause therefor. The Attorney General shall represent the Board, if requested, upon all such appeals unless he appeals or intervenes in behalf of the State. If the Attorney General or a member of his staff is not available to represent the Board in any particular proceeding, the Board is empowered to appoint special counsel for such proceeding. No bond or deposit for costs shall be required of the State or Board upon any such appeal or upon any subsequent appeal to the Supreme Court or other court proceedings pertaining to the matter.

(c) The appeal shall be heard and determined by the court upon the issues raised by the notice of appeal and the answer thereto according to the rules related to a trial in the nature of an appeal in equity of an administrative determination. All findings of fact by the Board are to be deemed final, unless it is shown that such findings were not supported by substantial evidence produced before the Board at the hearing. In any appeal or other proceeding involving any order, or other determination of the Board, the action of the Board shall be prima-facie reasonable and valid and it shall be presumed that all requirements of the law pertaining to the taking thereof have been complied with. A copy of the proceedings before the Board shall be certified to the Court in connection with each appeal.

(d) A further appeal may be taken to the Supreme Court of the State in the same manner as appeals in equity are taken.

Section 12. Conflicting Laws. This Act shall not be construed as repealing any laws of the State relating to the pollution of waters thereof or any conservation laws, but shall be held and construed as auxiliary and supplementary thereto, except to the extent that the same are in direct conflict therewith.

Section 13. Existing Rights and Remedies Preserved. It is the purpose of this Act to provide additional and cumulative remedies to prevent, abate and control the pollution of the waters of the State. Nothing herein contained shall be construed to abridge or alter rights of action or remedies in equity or under the common law or statutory law, criminal or civil, nor shall any provision of this Act, or any act done by virtue thereof, be construed as estopping the State, or any municipality or person, as riparian owners or otherwise, in the exercise of their rights in equity or under the common law or statutory law to suppress nuisances or to abate pollution.

Section 14. Severability. If any section, subsection, sentence, clause, phrase or words of this Act is for any reason held to be unconstitutional, such decree shall not affect the validity of any remaining portion of this Act.

Section 15. Short Title. This Act may be cited as the (State) Water Pollution Control Act.

Note: Where State law or practice requires that an appropriation authorization or an actual appropriation be made with basic legislation, such provisions should be incorporated into the "Suggested Act."

APPENDIX "F"

BEET SUGAR WASTES INVESTIGATIONS

The preponderant share of the industrial waste load contributed to the streams of the South Platte River Basin is produced by the beet sugar industry with twelve plants operating throughout the basin. The wastes from these establishments constitute a tremendous equivalent population load on the streams of the basin during the production season, October to January, and bring about nuisance conditions. These nuisance conditions, however, appear to clear up promptly after cessation of processing operations, except where the wastes from these factories find their way into storage reservoirs. In these instances they continue to create local nuisance problems until the waters are displaced or greatly diluted in the reservoirs by the high runoff in the late spring.

INVESTIGATION OF CHARACTERISTICS AND VOLUMES OF WASTES

The characteristics and volume of all the wastes from two beet sugar factories, one straight-house and one Steffens plant, and of two particular waste components from another factory, were investigated during the 1949 season. The procedures followed and the findings resulting from these studies are presented below.

General Information

Organization

The investigation was a cooperative project, conducted jointly by the Great Western Suguar Company and the Environmental Health Center of the U. S. Public Health Service.

Purpose

The investigation was made to secure information on the water pollution effects of the various wastes of the beet sugar factories investigated. This information enables estimation of the pollution load of wastes from factories using comparable equipment and processes.

Procedures

Before operations were begun, measuring devices for determining the quantity of total wastes and their components were installed at selected points in the factories under investigation. Sampling of the wastes was carried out over three separate periods of four or five days each at both factories, one period during the early weeks of factory operation, one period near the middle, and one period shortly before the close of factory operation. Samples were collected at hourly intervals and composited over a period of eight hours commencing at 8:00 a.m. and were iced during compositing, transporting, and storage periods. The flow of each waste was reasonably constant and operation of the factory was quite uniform; therefore, the resulting 8-hour composites are considered to be truly representative of the wastes.

transporting them.

At the terminus of the flume, a wheel elevates the beets to a washer. The flume water passes on through the wheel to the plant sewer. The washers are rectangular, vat-type chambers with continuous inflow and release of water. Agitation produced by revolving blunt blades removes the remaining dirt. The beets are discharged from the washer to a roller conveyor on which they pass through a final spray wash. Small pieces of beets, beet tails, roots, and leaves pass through the roller conveyor and are screened from the spray wash waste before it is discharged to the sewer.

The beets are elevated to the weighing apparatus and to the slicers where they are pressed against sets of rotating knives. These cut them into long narrow strips, called "cossettes", which are V-shaped in cross section. The cossettes are then transported to the diffusion battery.

Up to this point the process for the manufacture of sugar from beets is practically the same in all three factories investigated, there being only minor variations in equipment and in methods of operation. However, the equipment for the diffusion process of each of the factories differs. Two factories are equipped with cell-type diffusion batteries, one with the bottom dump type and one with the side dump type. The remaining factory investigated is equipped with a continuous diffuser. These differences in the diffusion equipment are important for the reason that they affect the strength and volume of the waste produced by the diffusion process.

The cell-type diffusion battery consists of a series of cylindrical steel tanks having a capacity of about 240 cubic feet (or about five tons) of cossettes each. The cells are interconnected by means of an intricate piping system, with a heating unit in the system between each cell. Sugar is extracted by passing hot water through the cells full of cossettes. The cells are filled in rotation; the fresh cossettes being added after the spent pulp is dumped. Fresh battery supply water at about 50 degrees to 55 degrees C. enters the cell containing cossettes which have been in the system for the longest period and from which, therefore, most of the sugar has been extracted. After passing through the other cells in series, being introduced progressively into cells which have been under diffusion for shorter periods of time, the water leaves by way of the cell which has been last filled with cossettes. The system is thus one of counter-current flow. Three cells are usually out of circulation for dumping and filling operations. The liquid drawn from the diffusion battery contains the sugar and considerable impurities extracted from the beets; it is known as raw juice.

When the cossettes in a cell reach the end of the diffusion process, the cell will have been receiving fresh battery supply water for a short time. The cell is then isolated from the circulating system and the contents dumped through a quick opening gate. Adhering pulp is flushed from the interior of the cell by battery wash water from high pressure

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hoses. It is in this dumping operation where the difference between the two kinds of cell-type diffusion batteries is important, since the side dump type requires the use of a great deal more water to flush it clean than does the bottom dump type.

The continuous diffuser in the one factory surveyed consists of a rectangular multiple compartment tank. The cossettes are admitted at one end and are carried on racks attached to endless chains in and out of the several compartments to the other end of the diffuser. Fresh water enters the diffuser at the point at which the cossettes are withdrawn, flows through the several compartments in opposite direction to the movement of the cossettes, and is withdrawn as raw juice at the end where the fresh cossettes enter. The battery is maintained at 85 degrees to 90 degrees C.

The spent cossettes after completion of the diffusion process are known as pulp. In the cell-type diffusion battery operation, the pulp, water contained in the cell when dumped, and the battery wash water are collected in a sump below the battery. This pulp suspension is pumped to a screen where the water is separated from the pulp. In the continuous diffuser operation, the pulp after being lifted from the diffuser is flushed by a heavy flow of cold water to a sump from which the resulting suspension is pumped to the screen.

At two of the factories investigated the pulp separated from the free water on the screen is stored in open silos pending disposal as stock feed. At one factory the pulp from the screen is partially dewatered in special presses preliminary to kiln drying. The dried pulp is sacked and sold as cattle feed.

There are certain differences in the process of purification of the juice depending on whether the factory is a straight-house operation or employs the Steffens process.

In straight-house operation, milk of lime is added to the raw juice and carbon dioxide (produced in a lime kiln from limestone and coke) is bubbled through the limed juice. In the Steffens house, calcium saccharate from the Steffens process is added to the raw juice instead of milk of lime. The remaining purification process is similar in both the straight-house and Steffens-house operation. After the first carbonation treatment, the precipitate is filtered or settled from the juice. The juice is carbonated a second time and the precipitate removed by filtering. The precipitate removed by the lime treatment and carbonation process is known as lime cake. It is diluted with water and discharged as a liquid waste.

After the second carbonation and filtration, the juice is treated with sulfur dioxide gas.

The purified thin juice, which contains 10% to 13% sugar, is concentrated in multiple effect evaporators to a syrup containing about 60%

sugar. This concentrate, known as thick juice, together with remelt sugar and high wash (the source of which is explained later), goes to the "blow ups", which are mixing and heating tanks. Filter aid, a diatomaceous earth, is added and the resulting mixture filtered. The filtered thick juice is then drawn into the white vacuum pan where it is evaporated, following which crystallization occurs. The mass of crystals and mother liquor, called white massecuite, passes to centrifugal machines in which the sugar crystals are retained on a wire screen, while the mother liquor, called high green syrup, is thrown through the screen. The last trace of syrup remaining on the crystals is washed through the screen with hot water. The resulting syrup is known as high wash.

The washed sugar is then dried in the granulators and sacked. High green syrup goes to the high raw vacuum pan. The high wash returns to the "blow ups".

The high green syrup is boiled again and centrifuged to obtain a second crop of crystals, called high raw sugar. High raw sugar goes to a melter and thence to the "blow ups". The mother liquor from this process, called machine syrup, passes to either the high or low raw pans. The machine syrup is boiled once more in the low raw pans and, after centrifuging, results in a third crop of crystals, low raw sugar. Low raw sugar is melted in the low raw melter and returned to the first carbonation tank of the raw juice purification process. The mother liquor or molasses from the low raw centrifuging is, in straight house factories, shipped to Steffens houses. In the case of Steffens houses the molasses from the low raw centrifuging is divided; part of it is subjected to the Steffens process, and part is shipped to a separate plant where additional sugar is recovered by a barium process.

The Steffens process consists of diluting the molasses and adding lime under carefully controlled conditions. The precipitate is filtered out and constitutes the calcium saccharate used in the first treatment of raw juice. The filtrate from this process is known as "Steffens Waste" and is discharged to the sewer.

Wastes

Flume Water Waste

This water comprises that used in floating beets from the railroad car dumping hopper and storage piles to the factory proper. By nature of the specific operation it becomes laden with considerable quantities of mud, sand and debris. The amount of such matter has been reported to vary with the soil conditions when the beets are dug (wet or dry) and with the method (hand or machine) under which the beets are harvested. Stones, weeds, beet tops and other material are present in relatively small quantities.

Beet Washer Waste

The beet washer waste is discharged from the vat-type mechanically agitated beet washer and from the final spray wash on the roller conveyor. The latter is screened before discharge.

Pulp Screen Water

This water is drained from pulp, after it is discharged from the diffusion process, on a special screen, called a faenger. The quantity and characteristics of this waste are influenced by the type of diffusion equipment at the factory. Reference is made to the Section on Manufacturing Process for details of the diffusion systems of the factories surveyed.

The strength of pulp faenger and pulp press water wastes is said to be appreciably influenced by the condition of the beets being worked. Freezing of beets and particularly their deterioration upon thawing produces stronger wastes. In general, this leads to stronger wastes as the factory operation progresses due to colder temperatures becoming more prevalent. However, in the case of piled beets, those on the outside may be frozen while the interior beets remain as good as any worked.

Pulp Press Water

Pulp press water is the liquid pressed from pulp after the pulp has been drained on the screen.

Pulp Silo Drainage

Factories, which do not dry pulp, store it after removal on the screen in large open pits called pulp silos. The pulp silo drainage is collected and drained through the underdrainage system of the silo.

Filter Cake Waste

The filter cake waste is the material removed by filtration of the lime treated and carbonated juice. The filter cake is removed from the filters, diluted with water, and discharged as a liquid waste.

Steffens Waste

In the Steffens process the molasses is treated with lime under controlled conditions to precipitate the sucrose as calcium sacchrate. The resulting slurry is filtered to recover the sacchrate; the filtrate constitutes the Steffens waste.

Condenser Water

Condenser water originates from the barometric condensers on the multiple effect evaporators and may contain small amounts of sugar entrained in the vapors emanating from the last effect.

TABLE 1

CHARACTERISTICS AND VOLUMES OF BEET SUGAR MANUFACTURING WASTES

Waste	Factory Number or Data Source*	Volume Gallons per ton of Beets	B.O.D. 5-Day 20°C.		Suspended Solids Lbs. pr ton of Beets	Total Solids			Volatile Solids			pH Average ppm	Total Alkalinity Average ppm
			ppm	Pounds per ton of Beets		Total Average ppm	Suspended Average ppm	Dissolved Average ppm	Total Average ppm	Suspended Average ppm	Dissolved Average ppm		
Flume Water and Beet Washer Waste	1	3,120	223	5.84	107	4,410	4,110	330	650	393	257	7.7	145
	2	2,240	194	3.63	81.0	5,270	4,320	990	800	380	420	7.6	235
	Eldridge	2,200	200	3.70	14.7	1,580	800	780	-	-	-	-	-
Pulp Screen Water Continuous Diffuser	1	406	909	2.98	3.5	1,800	1,020	780	1,140	800	340	6.9	111
Side dump cell Type Diffuser	2	1,420	510	5.54	7.4	1,990	620	1,370	850	380	470	7.8	160
Bottom Dump Cell Type Diffuser	3	240	979[a]	1.9[a]	1.1[a]	1,980[a]	530[a]	1,473[a]	1,626[a]	450[a]	1,173[a]	-	-
Pulp Press Water	3	180	1,710[a]	2.5[a]	0.6[a]	2,925[a]	420[a]	2,491[a]	2,555[a]	380[a]	2,181[a]	-	-
Pulp Screen and Press Water Combined	3	419	1,280[a]	4.4[a]	2.1[a]	2,402[a]	594[a]	1,771[a]	1,876[a]	472[a]	1,404[a]	-	-
	Eldridge	660	1,230	6.77	6.05	2,220	1,100	1,120	-	-	-	-	-
Pulp Silo Drainage	1	163	8,840	11.48	0.5	6,780	370	6,410	5,980	770	5,210	3.8	-
	2	270	6,010	12.37	0.4	4,810	170	4,640	3,510	140	3,370	4.0	3,000 (Acidity)
Filter Cake	1	135	6,840	8.23	163.2	140,400	136,600	3,800	16,200	14,600	1,600	11.6	96,000
	2	46	10,300	4.28	43.5	111,000	108,000	3,490	19,500	18,400	1,130	11.8	54,100
Filter Cake Lagoon Drainage	Eldridge	75	1,420	0.70	0.28	3,310	450	2,850	-	-	-	-	-
Steffens Waste	1	157[b]	10,940	14.48[b]	0.1[b]	25,000	100	24,900	11,310	40	11,270	12.6	8,210
	Eldridge	120	10,000	10.01	0.7	43,600	700	42,900	-	-	-	-	-

*Factory No. 1 - Steffens House, 2500 Tons/day capacity
Factory No. 2 - Straight House, 1640 Tons/day capacity
Factory No. 3 - Straight House, 1900 Tons/day capacity
Eldridge, Industrial Waste Treatment Practice, McGraw-Hill, N. Y. (1942) p.90.

a - Results for pulp screen water and press water, both separately and combined, are for wastes passed through a 30 x 40 mesh screen.

b - Figures for Steffens waste on per ton of beet basis apply to a factory such as that surveyed in which 47.3% of the molasses worked in the Steffens process is shipped in from other straight houses. The per ton of beet figure refers to the tons sliced at the factory utilizing the Steffens process.

FINDINGS AND DISCUSSION

The results of the investigations are given in Table 1. Included in the data for purposes of comparison are figures published by Eldridge (2). Factory numbers refer to the following:

Factory No. 1 - Steffens-house, 2500 Tons per day capacity
Factory No. 2 - Straight-house, 1640 Tons per day capacity
Factory No. 3 - Straight-house, 1900 Tons per day capacity

The characteristics and volume of all wastes were measured or estimated at factories No. 1 and No. 2, but at factory No. 3 only two components of the wastes were measured. Factors which influence the comparison of results among these factories are noted in the table.

The weather conditions prevailing throughout the season were unusually mild. Dry weather permitted the harvest of beets relatively free from mud; lack of extreme cold assured beets reaching the process in relatively sound and unfrozen condition.

The population equivalent (BOD basis) of the waste components at each factory is given in Table 2. This table also shows the breakdown of the total wastes from each factory and gives the percentage of the total wastes for each component. This breakdown covers both waste volumes and strength (BOD).

Flume Water Waste

Flume water waste makes up a large percent of the total waste volume but, being relatively weak, contains a smaller percent of the organic load. The waste contains large quantities of soil, sand, tailings, leaves and trash.

The reason for the suspended solids content of flume water at the Colorado factories being many times greater than that reported by Eldridge is not known. Difference in types of soil at the factory locations may account for the variation.

The silt content of flume water could be expected to be much higher if wet muddy weather prevailed during harvest. Dry weather prevailed during the Colorado studies.

Table 2

Comparison of Population Equivalents and Volumes of Wastes

	Population Equivalent		Volume	
	Per Ton of Beets BOD Basis	Percent of Total	Gallons per Day per Ton of Beets	Percent of Total
Factory No. 1, Steffens House[1]				
Flume Water Waste	29.4	11.4	2,620	65.8
Beet Washer Waste	5.6	2.2	500	12.6
Pulp Screen Water[2]	17.8	6.9	406	10.2
Pulp Silo Drainage	68.7	26.7	163	4.1
Filter Cake Waste	49.3	19.2	135	3.4
Steffens Waste[1]	86.7	33.6	157	3.9
Total	257.5		3,981	
Factory No. 2, Straight House				
Flume Water Waste	17.1	11.0	1,760	44.2
Beet Washer Waste	4.7	3.0	485	12.2
Pulp Screen Water[3]	33.1	21.4	1,420	35.7
Pulp Silo Drainage	74.2	47.9	46	6.8
Filter Cake Waste	25.7	16.6	270	1.1
Total	154.8		3,981	
Eldridge Data				
Flume and Washer Water	22	17.6	2,200	72.1
Combined Pulp Screen and Press Water	40	31.7	660	21.6
Effluent of Lime Cake Lagoon	4	3.4	75	2.4
Steffens Waste	60	47.3	120	3.9
Total	126		3,055	

1 - Steffens house processes molasses shipped in from other straight houses; such molasses constitutes 47.3% of total worked. Figure is for tons of beets sliced at Steffens house.
2 - Continuous type diffuser.
3 - Side dump cell-type diffuser.

Beet Washer Water

This waste was not sampled during the surveys. Other investigators have included this waste with flume water waste. This stems from the common source of pollution of the waters, namely, contact with the whole beets.

Pulp Screen Water

The volume and BOD of this waste are both quite high. The solids content is largely in solution.

The variations of this waste as produced by the different types of diffusers are of interest. Apparently the BOD load of the waste increases with the amount of water added to or dumped with the pulp.

Pulp Press Water

Pulp press water has greater BOD and solids content than pulp screen water but is of less volume. The pulp press water studied was at a factory equipped with bottom dump cell-type diffusers. It may be that the characteristics of this waste will differ somewhat with the type of diffusion process employed and with the method of handling the pulp.

Pulp Silo Drainage

Although this waste is of small volume it contributes a relatively large portion of the total BOD of the wastes. The quantity of this waste is influenced by the efficiency of the pulp screen in draining the pulp and by rainfall conditions. Possibly some water is produced as a decomposition product.

This waste has a low pH (4.0) brought about by the organic acids of decomposition.

Pulp silo drainage constitutes an odor nuisance problem in addition to its pollution characteristics.

Filter Cake Waste

This waste has a small volume and a high BOD. About 97% of the solids of the waste are in suspension. The pH of almost 12 shows the presence of much lime.

The great variation in the BOD load of this waste between the two factories is difficult to explain. There is reason to believe that the return of the calcium sacchrate of the Steffens process would increase the strength of the lime cake. Different equipment for the removal of the lime precipitate from the juice was used in the two factories surveyed. Factory No.2 filtered the juice following first carbonation. In factory No. 1 the carbonated juice was settled and the sludge filtered separately. Different types of filters were employed but their removal efficiencies are considered to be similar.

Variations in volume and concentration are not significant in these wastes since water is added to flush the cake to the sewer and to carry it off as a liquid waste. The type of filter, water pressure, factory management, etc., could account for variations in waste volume.

Steffens Waste

Steffens waste is of appreciable volume and extremely high in BOD. Practically all of its solids are in solution. The waste has a pH averaging 12.6, indicating a large content of lime.

Results based on beet tonnage are rather inappropriate because of the processing of molasses shipped in from other straight-house factories.

PILOT PLANT EVALUATION OF SCREENING, LIME TREATMENT, SEDIMENTATION, AND CHLORINATION OF PULP WATER

General Information

Organization

This waste treatment study was performed by the Great Western Sugar Company with assistance from the Environmental Health Center, U. S. Public Health Service. The company designed, constructed, and operated a pilot plant for waste treatment. The Public Health Service reviewed and commented on engineering drawings for the plant, assisted in its operation, and provided technical personnel for analytical and engineering work in connection with its operation.

Purpose

The objectives of the pilot plant research were to:

(1) Make determinations and comparisons on solids and BOD removals accomplished by chemical treatment and to corroborate published data.

(2) Determine amounts of chemicals needed for flocculation.

(3) Determine the necessity of screening wastes before treatment by coagulation and sedimentation.

(4) Obtain data on sludge volumes, concentrations and composition; and investigate methods of disposal.

(5) Explore reclamation and reuse of treated waste.

(6) Obtain data for the possible construction of a full scale plant.

Wastes Studied

This project included studies of pulp screen and pulp press water--both combined, and separately. The manufacturing process producing these wastes is discussed in the first section of this appendix. The diffusion equipment at this factory consisted of a bottom-dump, cell-type diffusion battery. The nature of the wastes produced was suspected of being affected by the condition of the beets, particularly whether or not they had been frozen. During the period of operation, the weather was unusually mild and the beets were in good condition.

A Link-Belt vibrating screen, 30 x 40 mesh, was provided for screening all pulp waste waters, including the portion diverted to the pilot plant.

The pilot plant was operated from October 14, 1949 to December 21, 1949.

Pilot Plant Design

Design

The Great Western Sugar Company utilized material already on hand for the main units of the pilot plant. The plant was designed to treat wastes at a rate of 10 gpm. The essential features were a weir box, chemical feeding devices, a flash mixing tank, a flocculation tank, a settling tank, and two sludge measuring tanks. The design and functioning of the plant followed, in general, standard practice as to retention periods, and overflow rates for chemical sewage treatment. The plant provided means for testing the accomplishment of waste treatment with lime and with chlorine.

Lime Treatment

The pilot plant was operated with lime treatment of combined pulp screen and pulp press water over a total of 26 sampling days. In addition, screen water was treated separately for four sampling days and pulp press water for five sampling days.

Samples were collected hourly, and composited over 24-hour periods. Analytical determinations were carried out on duplicate samples by Public Health Service personnel at a laboratory in Denver and by the Great Western Sugar Company Research Laboratory. In general, the analytical procedures employed were those given in "Standard Methods for the Examination of Water and Sewage", 9th Edition, 1946 (1).

In addition, some bacteriological studies were made of lime treated wastes. The results are included in the chlorine treatment section.

Findings - Jar tests indicated that doses of lime in the neighborhood of 400 ppm (CaO) were necessary to produce optimum coagulation of pulp screen and pulp press water. The shop fabricated lime feeder did not permit accurate control of lime feed, resulting in variations of lime dosage as much as ±25%. Lime dosages of 600 to 800 p.p.m. (CaO) were used to insure optimum coagulation.

A summary of the BOD and suspended solids data is given in Table 3. Sludge resulting from lime treatment was a greenish-tan, viscous liquid with solids concentration averaging 5.5% and constituted about 2% of the volume of waste treated. Methods of disposal were not explored. However, sugar company officials were confident that the sludge could be added to pressed pulp and dried for cattle feed.

The sugar content of combined pulp screen and pulp press water ranged between 650 and 980 p.p.m. Subtraction of the theoretical BOD of the sugar content from the BOD of the treated and untreated wastes gave values for the reduction of non-sugar BOD's of about 50%.

Chlorine Treatment

The pilot plant was operated over six sampling days with chlorine treatment of combined pulp screen and pulp press water. Hypochlorite solution (HTH) was used as a source of chlorine for these experiments.

Sampling and analyses were conducted as described above for lime treatment. In addition, the density of thermophilic organisms was determined in treated and untreated wastes by plating samples in nutrient agar and incubating them 24 hours at 50° C. Jar tests were also carried out to establish the survival of thermophilic organisms in the wastes with various chlorine doses and contact times.

The presence of thermophilic bacteria in pulp screen and press water is important in considering reuse of the water, as discussed in a subsequent section.

Findings - The removal of BOD and suspended solids accomplished by treatment of combined pulp screen and pulp press water with 50 p.p.m. chlorine is reported in Table 3. This chlorine dose produced a residual of from 3 to 6 p.p.m. in the pilot plant overflow, with the plant operating so as to provide about 2 hours' theoretical retention time. No difficulty was experienced in maintaining chlorine residuals in jar tests at doses as low as 25 p.p.m. Reliable data were not obtained on volumes and concentrations of sludge produced during chlorine treatment. It was evident, however, that the sludge volume was considerably less than that produced by lime treatment.

Thermophilic organisms were found in untreated screen and pulp press water in numbers ranging from about 200,000 to 3,000,000 organisms per milliliter. These organisms were present in pilot plant effluent up to 40 per milliliter. In jar tests high bacteria kills were accomplished in these wastes by chlorine dosages as low as 7 ppm and 10 minutes' contact time. Lime treatment in the pilot plant as shown by three tests reduced the thermophilic concentration to 279, 25, and 32 organisms per milliliter. Lime treatment in jar tests at a 600 ppm CaO dose and contact time as low

Table 3

Summary of B.O.D. and Suspended Solids Data from Pilot Plant Studies of Screened Pulp Faenger Water and Pulp Press Water

Waste	Treatment	Results								
		Sample - 24-Hour Composites	B.O.D. 5-Day 20° C				Suspended Solids			
			Avg. ppm	Max. ppm	Min. ppm	Average Percent Reduction	Avg. ppm	Max. ppm	Min. ppm	Average Percent Reduction
Pulp Faenger Water and Press Water (Screened)	Lime Treatment	Untreated	1282	1720	940	26	594	970	410	91
		Treated	940	1310	605		49	75	22	
	Chlorine Treatment	Untreated	1207	1700	1010	8	585	590	580	30
		Treated	1144	1330	995		412	416	408	
Faenger Water (Screened)	Lime Treatment	Untreated	979	1260	725	36	530	600	450	90
		Treated	631	760	445		54	72	39	
Pulp Press Water (Screened)	Lime Treatment	Untreated	1708	1880	1540	26	420	470	390	89
		Treated	1308	1690	1065		40	42	37	

as 30 minutes reduced the thermophilic bacteria densities from 1,200,000 to 18 per milliliter.

Recovery of Pulp from Pulp Screen and Press Water by Fine Screening

Pulp screen and press water contain visible quantities of screenable solids. Recognizing this potential pulp recovery, the company installed a 30 x 40 mesh, 0.015" wire size, vibrating screen, 26.7 square feet in area. The screen was installed at the same factory in which the pilot treatment plant was located. It was originally planned to operate the pilot plant using both screened and unscreened wastes. After observation of the substantial quantities of pulp in the unscreened wastes, it was concluded that fine screening was a necessary preliminary measure and consequently the pilot plant was not operated on unscreened waste.

Capacity of Screen - The screen proved to be of sufficient size to handle the total combined pulp screen and pulp press water of the factory. The capacity of the screen for handling these combined waters was about 22 gallons per square foot per minute.

Pulp Recovery - Several obscuring factors plus inconsistent data preclude an exact statement of the amount of pulp recovered from combined pulp screen and pulp press water. The data indicate a minimum feed recovery of 2.5 pounds of dry solids per ton of beets.

According to persons familiar with sugar beet processing, the amount of pulp passing the screen and presses is a highly variable thing, influenced markedly by the condition of the beets and the presses.

Despite the lack of an exact figure, recovery of pulp solids by fine screening reduces the concentration of the waste so significantly that such treatment should be established as a routine treatment measure and a recommended feature of treatment.

SCREENING OF COMBINED FACTORY WASTES

General Information

The Great Western Sugar Company planned and constructed an installation for the screening, by vibrating screen, of the combined factory wastes of a straight-house beet sugar factory. The Public Health Service reviewed the plans and observed the operation of the screens.

The project proposed to establish the value of fine screening as a treatment measure for alleviating pollution characteristics of the wastes and to determine the quantity and character of the recovered material. It was expected that the recovered material could be utilized as cattle feed.

Periods of operation divided according to the screens used were as follows:

Coarse screen - October 13 to October 19, 1949.
Medium screen - November 22 to December 12, 1949.
Fine screen - October 22 to November 8, 1949.

Wastes Studied

The survey was conducted at Factory No. 2 where the combined straight-house wastes were studied. The combined wastes were made up of flume and washer water, pulp screen water, and pulp silo drainage; filter cake waste and a small portion of diffusion battery waste (diverted to the ash pit) were not included.

Procedure

The pumping station and screen were installed about a mile from the factory. The combined factory wastes flowed through an open ditch from the plant to a diversion ditch where most of the wastes were conveyed to a lagoon. The wastes not diverted continued on to the screen station. The pump feeding the screen drew its supply from a sump in the ditch. Screens with openings of three different sizes were tested.

The quantity of material removed by screening was determined by weighing the material.

Findings

The results are presented in the following table:

Screen	Size of Clear Openings (inches)	Quantity of Material Removed, Wet Basis* Adjusted to Total Flow of Combined Wastes		Capacity of Screen Gallons per Minute per Square Foot
		Tons at Factory	Pounds per Ton of Beets	
Coarse	5/32 x 10/16	6	7.3	Not determined
Medium	1/16 x 5/16	30	36	37.5
Fine	1/32 x 9/30	18 - 20	22 - 24	Needed cleaning at about once per hour at 28 to 37. Passed 10 with no difficulty.

*10% dry substance

The material removed consisted of small pieces of beets, beet tails, beet leaves, pulp, and trash. The coarse screen was found to be ineffective in removing suspended solids such as the spent cossettes.

It is apparent that the data on quantity of material recovered are inconsistent. This presumably was due to the inability to supply representative portions of the waste to the screen at all times. The figure for the medium screen is considered to be the most reliable.

The principal difficulty in the fine screen operation at high capacities was due to fine hair-like roots from the beets clogging the screen openings.

Screening had no apparent effect on the BOD or total solids. This is probably accounted for by the fact that it is practically impossible to obtain accurate samples of a waste containing a high percentage of suspended solids of such wide variation in particle size.

LAGOONING OF COMBINED FACTORY WASTES

General Information

The Great Western Suguar Company planned and constructed lagoons for treating screened and unscreened combined wastes of a straight-house beet sugar factory. The Public Health Service reviewed the plans, provided technical aid, and made analytical determinations of samples.

The project proposed to (1) establish the value of treatment of combined wastes by their retention in small earth lagoons for short periods, (2) evaluate the screening of the wastes prior to lagooning as a means of increasing the effectiveness of treatment by such lagooning, and (3) evaluate the addition of chemicals as a means of accelerating biological treatment in lagoons.

The wastes studied were the same as those described in the previous section concerning the screening of combined factory wastes.

Procedure and Findings

Main Lagoon

The combined wastes of the factory were lagooned in a large, irregular pool, varying from a few inches to several feet in depth. This lagoon was estimated to provide 3 to 5 days' detention.

The suspended solids removal in this lagoon was excellent. The total suspended solids in the influent and effluent averaged 2292 and 33 ppm, respectively, a reduction of 98.6%.

The B.O.D. of the influent and effluent averaged 652 and 575 ppm, respectively, a reduction of 11.6%.

Lagooning of Screened and Unscreened Wastes

Small lagoons were used for the comparative studies with screened wastes. Each lagoon was approximately 100 x 210 feet in plan with a depth averaging about 4 feet.

The combined factory wastes were diverted to the screen as discussed in the preceding section on the screening of combined wastes.

During the period October 13 through October 19, unscreened wastes were discharged into one lagoon, and coarse screened (5/32" x 10/16" clear openings) wastes were discharged to another lagoon. Since this screen was found to be ineffective, the coarse screen study was discontinued.

A fine screen (1/32" x 9/30" clear openings) was installed.

Commencing October 22, fine screened wastes were discharged to a third lagoon; and unscreened wastes were discharged to the lagoon previously used. The volume of wastes discharged to each lagoon corresponded to a theoretical retention period of about 2 days. Leakage and seepage reduced the volume of the effluent to as much as 50% of the inflow. Results accomplished are tabulated below.

	Unscreened Waste Lagoon			Fine Screened Waste Lagoon		
Determination	Influent	Effluent	% Reduc.	Influent	Effluent	% Reduc.
Flow (gpd)	346,900	283,300		319,600	154,300	
pH	6.4	5.5		6.5	5.6	
BOD, 5-day, 20° C. (ppm)	658	588	10.6	646	548	15.1
Solids:						
Total (ppm)	4,052	1,735	57.2	3,943	1,752	55.5
Suspended (ppm)	2,670	105	96.1	2,681	82	96.9

Inspection of the average data shows the influents to these lagoons to have similar characteristics. Both lagoons were effective in removing suspended solids; the lagoon receiving screened wastes gave a slightly greater BOD reduction.

Lagooning of Nitrate and Phosphorus Treated Wastes

During the period from November 22 to December 12, 1949, experiments were conducted on the addition of chemicals to the lagoons containing screened wastes. For comparison, lagoons were (a) treated with ammonium nitrate, (b) treated with ammonium phosphate, and (c) not treated.

It may be concluded that the duration of these studies was too short to determine any benefits which might result from the addition of these chemicals to the wastes. Sugar company personnel noted less odor from the nitrate treated lagoon.

WASTE DISPOSAL

The following concepts concerning methods of disposal of the wastes from beet sugar manufacture are based on the findings previously reported and on the technical literature.

Flume and Beet Washer Water

Flume water and beet washer water can be settled and reused in a closed system. Under certain conditions chlorination of the settled flume water may prove desirable. Where low temperatures and freezing of the water during treatment would be a problem, it may be feasible to maintain desirable temperatures by a combination of the condenser water and flume water systems.

Clarification of flume water would yield considerable quantities of sediment consisting mostly of sand, silt, and clay. This material would be disposed of by pumping it as a thick slurry to a closed lagoon. The term, "closed lagoon", refers to a pond without overflow as opposed to a pond providing a few days' retention. The quantity of deposited material in its ultimate settled and drained condition, for a 2000-ton plant for a 70-day operating season, may be expected to be from 2 to 3 acre-feet. These values are based upon the data obtained from the surveys described above. During muddy harvest seasons these figures may be materially increased.

Pulp Screen and Pulp Press Water

One positive method of disposing of pulp screen water is the use of certain equipment and processes which do not produce this waste. Such elimination would be realized in a plant equipped with both a continuous diffuser and a system for mechanically transporting the drained pulp from the diffuser.

The reuse of pulp screen and pulp press water in the diffusion battery appears to be feasible. The use of some of the pulp screen and pulp press water for diluting molasses in the Steffens process is also possible. A number of methods of treatment of these wastes preliminary to reuse have been reported. The advantages and competitive status of these methods have not been definitely established. The greatest single impelling force for reusing pulp screen and pulp press water is the elimination of these wastes, although some of the impurities may be contained in wastes of succeeding processes.

The investigations reported in this appendix show that lime treatment of combined pulp screen and pulp press water removes in excess of 90% of the suspended solids and about 30% of the BOD. There is justification for fine screening of both pulp screen water and pulp press water, regardless of their reuse or disposal.

Pulp Silo Drainage

Drying of pulp eliminates wet pulp silos and consequently pulp silo drainage. Provision of pulp presses and driers would solve this disposal problem and substantially increase the feed yield per ton of beets. The production of dried pulp offers a much higher return than the present methods of handling wet pulp. There may be marketing problems involved in disposing of large volumes of dried pulp.

Lime Cake Waste

Lime cake can be transported from the factory in a comparatively dry state as it comes from the filters. If the plant design does not permit handling the dry cake, the slurry can be lagooned.

Lagooning of the slurry in a closed lagoon would necessitate impoundments of considerable capacity. The data gathered in this survey would indicate that, for a 2000-ton straight-house operating over a 70-day period, the total volume would amount to about 20 acre-feet, the sediment of which could be expected to amount to about 1.5 acre-feet. A 2000-ton Steffens house, processing an additional 50% shipped-in molasses and operating over a 70-day period, would produce an estimated 60 acre-feet of lime wastes. The sediment could be expected to amount to about 5 acre-feet. The volume of this waste could be greatly reduced by more conservative use of water in flushing lime cake to sewers. Lagoons providing a few days' retention would greatly reduce the waste load from this source.

Steffens Waste

It has been demonstrated that monosodium glutamate can be produced from Steffens waste. Present practice in this country involves the evaporation of the waste and its shipment to a special plant for recovery of the glutamic acid. Fertilizer salts and molasses for fortification of stock feed may be recovered from Steffens waste in addition to glutamic acid. This complete utilization eliminates the waste.

If unfavorable economics makes these recovery processes impractical, the Steffens waste might possibly be lagooned. Unless topographic conditions near the plant were extremely favorable, a lagoon of the required capacity seems rather impractical. Such lagooning would undoubtedly present a serious odor problem.

Condenser Water

Condenser water was not considered a waste in the surveys reported in this appendix. If the re-use and disposal methods discussed above are employed, condenser water could possibly appear as a separate waste. This possibility would be eliminated by recirculation of the condenser water through a cooling tower in a closed system.

POLLUTION ABATEMENT PLANS
GREAT WESTERN SUGAR COMPANY

The Great Western Sugar Company is continuing studies and experiments pertaining to waste elimination in order to comply with expected water pollution abatement requirements. These efforts are being concentrated on wastes from a modernized factory. Certain features of planned modernization programs affect the wastes; these are replacement of the multiple cell-type diffusers with continuous diffusers, replacement of the older type filters, and the installation of pulp driers. To date, two factories have undergone some modernization. It appears that this modernization program will enhance pollution abatement through the elimination and re-use of wastes.

Specific plans for 1950 include the installation in one factory of a scroll for mechanically transporting pulp from the continuous diffuser to pulp presses. Therefore, pulp screen water will not be produced. Pulp press water at this factory will be screened and re-used. About three-fourths of the pulp press water will be lime-treated and settled, and the supernatant will be used for dilution of Steffens molasses. The remaining one-fourth will be re-used in the diffuser. Provisions are to be made for lime treatment of this portion if desired before re-use. Furthermore, treatment by heating, chlorination, or carbonation,may be tested. This system will eliminate pulp screen and pulp press water wastes at a Steffens house. At a non-Steffens factory, re-use of pulp press water would be limited to the diffuser. With this in mind, the company plans to re-use all of the pulp water in the diffuser during part of the season. Experiments on the disposal of the sludge from lime treatment of pulp water will also be carried out.

The company plans extensive process development and experimentation on the evaporation of Steffens waste for recovery of glutamic acid, fertilizer salts, and stock feed molasses.

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APPENDIX "G"

BACTERIOLOGICAL STUDY OF IRRIGATED FRUITS AND VEGETABLES

Introduction

One phase of water pollution in the semi-arid regions which poses special difficulties is the use of waters containing wastes discharges, especially sewage, for irrigation of crops. The greatest of these difficulties is the determination of the relative degree of danger afforded when such waters are used for the irrigation of any particular type of crop. A similar situation existed a number of years ago in regard to drinking waters. Exhaustive studies by the Public Health Service and others resulted in the setting of criteria by which the relative quality of waters could be measured as to their acceptability for use with varying types of treatment. These criteria have been generally accepted by public health authorities and waterworks authorities alike as reasonable measurements of water quality as it pertains to potable water supplies.

In the matter of irrigation waters, no similar studies have been conducted and, as a result, there are no generally accepted criteria by which the relative safety of such waters may be determined. Sewage treatment requirements and acceptable standards of bacterial purity for waters used for irrigation purposes are now largely a matter of judgment and experience. Whether or not current practices in this regard are satisfactory is a moot question which can only be answered after adequate bacteriological and epidemiological studies have been made. The rapid growth of the western states during the past 20 years or more has resulted in certain complications with regard to the use of surface waters for irrigation purposes. As population has increased, the pollution load upon the streams has also increased. Since in many areas waters which do not contain sewage are not available for irrigation use, it is becoming more important to establish criteria which may be used for the purpose of measuring the relative danger of these waters for the irrigation of certain types of crops, particularly vegetables and small fruits - some of which may be consumed in the raw state.

There is little information available concerning the degree of pollution which should be allowed in irrigation waters. In some states, limiting values have been placed upon allowable bacterial content for such waters, and limitations have been placed upon their use. In 1942 the Joint Committee of the Sanitary Engineering Division and the Irrigation Division of the American Society of Civil Engineers on the Salvage of Sewage indicated that, as far as existing facts are concerned, it would appear that bacteriological standards for irrigation water need not be considered on the same basis as those for drinking water. Their findings indicated that sewage treatment which affords about 85% reduction in B.O.D. and suspended matter, followed by adequate chlorination of the plant effluent, would be satisfactory for irrigation usage.

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As the question of bacteriological standards for irrigation waters remains unsettled and is a source of much controversy, a study of the bacteriology of irrigation waters containing sewage effluents and of the crops irrigated with such waters was undertaken concurrently with the South Platte River Water Pollution Investigation. A partial review of the literature on public health aspects of irrigation with waters contaminated with sewage is presented as a supplement to this appendix.

Bacteriological studies of vegetables and fruits irrigated with sewage-polluted water were begun in July 1949, in Denver, Colorado. The preliminary work, July to September 1949, was essentially to determine the pollution load of the irrigation water, the soil, and the plants in terms of Coliform and Enterococci densities. In addition, several samples of raw and treated sewage from the Denver sewage disposal plants were examined for the purpose of determining the pollution load discharged into the South Platte River, from which most of the irrigation system receives its supply.

The current studies, resumed in March 1950, emphasize the isolation of enteric pathogenic bacteria from the waters, the soil, and the plants. Soil studies are also being made to determine the bacterial population during pre-irrigation, irrigation, and post-irrigation periods. These studies will continue.

Summary of Results to Date

It is not possible, at this time, to draw any firm conclusions based on the data obtained thus far. The results may be summarized in the following general terms:

1. The waters used for irrigating vegetable crops show relatively high Coliform and Enterococcal densities.

2. The Coliform density of the soil appears to be of the same order as the Coliform density of the water with which the soil is irrigated.

3. The Enterococcal density of the soil appears to have no relation to the Enterococcal density of the water with which the soil is irrigated.

4. Leafy vegetables, such as lettuce, cabbage, and celery, show Coliform densities that equal or exceed those of the irrigation water.

5. Strawberries and smooth vegetables (tomato, pepper) show very low Coliform densities regardless of the densities of the water and of the soil in which grown. However, carrots show high Coliform densities.

6. A large number of Salmonella, mostly Groups B and C1 and some Shigella were isolated from samples of sewage, river water, and

irrigation water.

Objectives

The objectives of this investigation are:

1. To determine the pollution load of vegetables irrigated with sewage-polluted waters, using Coliforms and Enterococci as bacterial indicators.

2. To isolate enteric pathogens from the vegetables.

3. To study the entire scope of the problem as it relates to the potential dissemination of pathogenic organisms that may be introduced onto or into the vegetables by the polluted irrigation water.

Sampling Procedure

Sampling areas were selected at farms receiving irrigation water from several sources, ranging from heavily sewage-polluted sources to those relatively unpolluted.

The sampling equipment consists of:

1. Sterile glass containers for water and for soil.
    (a) Two-gallon jars for water.
    (b) One-quart jars for soil.
2. Sterile "Kraft" paper bags, size "60 lb." for plants.
3. Sterile knife, in paper wrapper.
4. Sterile spoon, in paper wrapper.
5. Sterile forceps, in paper wrapper.
6. Carrying case with ice for transportation of samples.

Samples of irrigation water were collected by dipping the jar into the water.

The vegetable samples were taken by placing an opened, sterile, paper bag over the entire plant and pulling it out of the ground with the roots, where possible (celery), or by cutting off the main root or stem with a sterile knife (cabbage, lettuce). The bag was then inverted, the plant permitted to drop to the bottom, and the top of the bag was folded over several times.

Strawberries and other stemmy fruits were collected with sterile forceps and dropped into a sterile bag or jar.

Table I

Farms from which Samples were Collected
Showing Location, Source of Irrigation Water and of Contamination

Farm	Location	Source of Irrigation Water	Fed by	Source of Pollution
Giacomo	Brighton Road	Gardner's Ditch	So. Platte R.	(Denver Sewage Plant (Packing Plant Waste
Nakamura	Oxford Street	So. Platte River (Petersburg Ditch)[1]	So. Platte R.	Littleton Sewage
Lewis	West 44th Ave.	Wanamaker Ditch	Clear Creek	Golden Sewage
Markoff	West 64th Ave.	Rocky Mt. Ditch	Clear Creek	Golden Sewage
Peterson	Henderson, Colo.	Fish Hatchery (Burlington Ditch)[2]	Well water So. Platte R.	Fish ponds Denver Sewage Plant

Notes: 1 - Petersburg Ditch diversion was not in operation; water pumped directly from river.

2 - Burlington Ditch used only occasionally. Not used at time of sampling.

Soil samples were collected with a sterile spoon into sterile quart jars. The soil was taken from the site of the plant after it had been removed.

Pertinent data regarding location of the farm, source of irrigation water, water temperature, frequency or last period of irrigation, where applicable, were recorded.

Table I shows the farms from which samples were collected, their location, the sources of their irrigation waters, and the sources of pollution affecting these waters.

Preparation of Samples for Examination

1. Soil

(a) A sterile, glass, two-gallon jar with metal screw cap and metal liner was tared, and into it 200 g. of soil were weighed, using a sterile spoon.

(b) Two liters of sterile, phosphate buffered, distilled water was added to the soil.

(c) Two milliliters of "Triton X-100" were added, the cap replaced, the mixture shaken and allowed to stand for ten minutes to permit wetting action by the Triton.

(Triton X-100 is a non-ionic wetting agent; an alkylated aryl polyether alcohol, anhydrous, water soluble, manufactured by Rohm and Haas Company, Philadelphia 5, Pennsylvania. It is claimed not to be bactericidal or bacteriostatic in the concentrations used.)

(d) The mixture was then shaken 50 times in one-foot vertical excursions, the coarse particles allowed to settle, and planted in appropriate media.

2. Vegetables

(a) The paper bag containing the vegetable sample was laid on a table and torn open exposing the plant. With sterile knife and forceps, 200 g. of the sample were weighed into a sterile, tared, two-gallon jar.

(b) Two liters of sterile buffered distilled water and 2 ml. of Triton X-100 were added, shaken, and allowed to stand for ten minutes.

(c) The contents were then shaken 50 times in one-foot vertical excursions, allowed to settle, and planted in appropriate media.

(d) Coliform and Enterococcus determinations were also made of leaves of some of the vegetables studied to determine the extent of contamination above ground due to splash or other factors. The method used for the preparation of leaf samples was the same as that described for vegetables.

(e) Minced samples of vegetables were prepared by weighing 50 g. of the sample into a sterile, tared Waring Blendor mixing bowl. To this was added 500 ml. of sterile, buffered distilled water. The contents were minced for a period of two to five minutes, depending upon the vegetable. The material was then planted in appropriate media.

It will be noted by the weight-volume ratio of the sample to the rinse water, that a 1:10 dilution was used. This should be borne in mind when interpreting the reported MPN values of Coliform and Enterococcal densities, which are in terms of 100 ml. of rinse water examined and represent the densities per 10 g. of the original sample. It is believed that, for solid substances, densities per gram of sample are preferable and are more generally used. The reported MPN values, therefore, should be divided by ten in order to convert them into MPN values per gram of plant examined. No correction should be made of the MPN values of irrigation water since the reporting of those values in terms of 100 ml. is standard practice.

On a few occasions, when it was not possible to maintain a 1:10 dilution during the preparation of the sample, the MPN values reported have been corrected to a 1:10 base by interpolation.

Bacteriological Methods

Procedures for the determination of Coliform density were performed in accordance with Standard Methods (1). Procedures for the determination of Enterococcal density were performed in accordance with instructions contained in a circular issued by the Environmental Health Center (2).

Results

General - The results of the bacteriological examination of irrigation water, soil, plants, and sewage are presented in Tables II, III, and IV. Table II shows the Coliform and Enterococcal densities, MPN per 100 ml. of water or of rinse examined, according to source. Table III shows these densities in relation to the plants examined regardless of source. Table IV shows the results of the sewage samples examined.

Vegetable Washing - Although this investigation in its initial and current phases has not been concerned with vegetable washing, the following data obtained in a single investigation are believed valuable as an indication of the significance of this part of the problem. Instances have been noted where vegetables have been washed in polluted irrigation ditch water in preparation for marketing.

Samples taken for this examination included: carrots taken directly from the ground; carrots washed in the irrigation water; soil; and irrigation water. The significant results are:

1. Carrots washed in the irrigation water show a Coliform density (MPN) of 93,000 per 100 ml. of rinse, while carrots pulled out of the ground show 12,000 per 100 ml.

2. Rinse, prepared from the tops (leaves) of carrots washed in the irrigation water, is the only sample from this group, with the exception of the irrigation water sample, to show presence of Enterococci. The Enterococcus density of the leaf rinse was 75 per 100 ml. and of the irrigation waters, 2,300 per 100 ml.

The results are shown in Table II - "Markoff" and in Table III - "Carrot".

Isolation of Enteric Pathogens

There are no "standard" methods for the isolation of enteric pathogens similar to the "Standard Methods" for the bacteriological examination of water sewage, milk, and milk products. Most of the literature describing methods for the isolation of enteric pathogens is concerned almost entirely with fecal or urine specimens and occasionally with blood samples for the diagnosis of enteric diseases. The isolation of Salmonellae and Shigellae from sewage water and soil presents problems not found in clinical practice. The most important difference between the two types of samples is the low concentration of enteric pathogens and the high concentration of Proteus and other interfering organisms in sewage and particularly in river waters, irrigation waters, and in the soil. This low concentration of pathogens necessitates the examination of large volumes of sample.

The methods used in this laboratory are still in the process of evaluation. In addition to personal experience, several procedures have been freely modified, notably those of Galton, Hardy and Mitchell (3). The procedures used are essentially as follows:

1. One to two liters of the sample is concentrated in a continuous electric centrifuge (Foerst).

2. The concentrate is planted into a number of tubes containing tetrathionate broth. In order to keep the growth of Proteus organisms to a minimum, tetrathionate broth should be incubated for not longer than 12 hours, preferably 6 to 9 hours, at 37° C.

3. Streak all tetrathionate broth cultures on plates of brilliant green agar (Kauffman) (BG), Shigella-Salmonella Agar (SS) and Bismuth Sulphite Agar (BS).

Table II. **Coliform and Enterococcus Densities of Vegetables, Soil, and Irrigation Water According to Source**

Date 1949-1950	Vegetable	M.P.N. per 100 ml. of Water or Rinse							
		RINSE		BLEND		IRRIGATION WATER		SOIL	
		Coli.	Ent.	Coli.	Ent.	Coli.	Ent.	Coli.	Ent.
Giacomo - Gardner's Ditch, South Platte River; Clear Creek; Spring									
	CELERY:								
July 18	Stalk	93,000	< 3.0	15,000	< 3.0	93,000	930	23,000	< 3.0
	Leaves	9,300	< 3.0						
Aug. 2	Stalk	43,000	< 3.0	930	< 3.0	230,000	2,300	1,100,000	930
	Leaves	7,500	< 3.0						
22	Stalk	240,000	< 3.0			21,000	2,300	430,000	< 3.0
	Leaves	>11,000	< 3.0						
	PEPPER:								
30	Whole	105	< 3.0			2,400,000	930	46,500	< 3.0
	Leaves	215	< 3.0						
Sept. 6	LETTUCE	750,000	< 3.0	240,000	4,600	43,000	930	230,000	24,000
March 21								16,000^a	3.0
								930^b	43
29								230^a	43
								750^b	93
April 5								430^a	< 3.0
								2,300^b	< 3.0
13								23^a	< 3.0
						4,600,000	9,300	460,000^b	2,300
						11,000,000	9,300		
17								4,300^a	< 3.0
						43,000^c	9,300	430^b	3.0

April 24	LETTUCE							1,500[a]	7.3
								4,300[b]	<3.0
	ONION First Rinse	4,600,000	< 3.0			93,000	930	7,500	43
	Second Rinse	2,100	3.0						
	Third Rinse	430	< 3.0						
May 1								9,300[a]	< 3.0
								120[b]	< 3.0
	ONION	23,000	64			230,000	4,300	23,000	230
11								430[a]	< 3.0
								2,300[b]	< 3.0
17								210[a]	< 3.0
								460,000[b]	4,600
Peterson - Well Water — Fish Pond (Hatchery) — Irrigation									
Aug. 24	PEPPER:					21,000[d]	430[d]		
	Whole	11.5	< 3.0			43[e]	3.0[e]	26,200	< 3.0
30	Leaves	115	< 3.0						
Lewis - Wanamaker Ditch, Clear Creek									
Aug. 1	STRAWBERRY	150	< 3.0	2,300	< 3.0	430,000	4,300	230,000	3.0
Sept. 20	TOMATO	9.1	< 3.0	15	< 3.0	230,000	4,300	9,300	7.3
Markoff - Rocky Mt. Irrigation Ditch, Clear Creek									
	CARROTS:								
Sept. 12	Unwashed:								
	Whole	12,000	<3.0	46,000	<3.0	230,000	2,300	230,000	<3.0
	Leaves	240,000	<3.0						
	Washed:[f]								
	Whole	93,000	<3.0	46,000	<3.0				
	Leaves	240,000	75						

Table II (Continued)

Date 1949-1950	Vegetable	M.P.N. per 100 ml. of Water or Rinse							
		RINSE		BLEND		IRRIGATION WATER		SOIL	
		Coli.	Ent.	Coli.	Ent.	Coli.	Ent.	Coli.	Ent.
Nakamura - South Platte River, 0.5 mile downstream from Petersburg Ditch Diversion									
Aug. 8 Sept. 19	CABBAGE LETTUCE	110,000 1,600	23 < 3.0			93,000[f] 93,000[g] 93,000	15,000 15,000 750	430 93,000	<3.0 24.0

NOTES:
a - Upper field; irrigated by Clear Creek; first irrigation in 1950 on April 23.
b - Lower field; irrigated by Gardner's Ditch; first irrigation in 1950 on March 19.
c - Spring water (in irrigation ditch).
d - Fish pond water at irrigation diversion gate.
e - From pump, at inlet to pond.
f - Irrigation water from header canal.
g - Irrigation water from cabbage patch.

Table III. Coliform and Enterococcus Densities of Vegetables, Soil, and Irrigation Water According to Plants Examined

VEGETABLE	M.P.N. per 100 ml. of Rinse or Water								
	RINSE		BLEND		IRRIGATION WATER			SOIL	
	Coli.	Ent.	Coli.	Ent.	Coli.	Ent.	Ent:Coli Ratio	Coli.	Ent.
CELERY:									
Stalk	240,000	<3.0			21,000	2,300	1:9.1	430,000	<3.0
Leaves	>11,000	<3.0							
Stalk	93,000	<3.0	15,000	<3.0	93,000	930	1:100	23,000	<3.0
Leaves	9,300	<3.0							
Stalk	43,000	<3.0	930	<3.0	230,000	2,300	1:100	1,100,000	930
Leaves	7,500	<3.0							
LETTUCE	750,000	<3.0	240,000	4,600	43,000	930	1:46.3	230,000	24,000
"	1,600	<3.0			93,000	750	1:124	93,000	24
CABBAGE	110,000	23			93,000	15,000	1:6.2	430	<3.0
STRAWBERRY	9.1	<3.0	15	<3.0	230,000	4,300	1:53.5	9,300	7.3
"	150	<3.0	2,300	<3.0	430,000	4,300	1:100	230,000	3.0
TOMATO[1]	3.0	<3.0	6.9	<3.0					
PEPPER:									
Whole	11.5	<3.0			21,000	430	1:48.8	26,200	<3.0
Leaves	115	<3.0							
Whole	105	<3.0			2,400,000	930	1:2580	93,000	<3.0
Leaves	215	<3.0							

Table III (Continued).

VEGETABLE	M.P.N. per 100 ml. of Rinse or Water								
	RINSE		BLEND		IRRIGATION WATER			SOIL	
	Coli.	Ent.	Coli.	Ent.	Coli.	Ent.	Ent:Coli Ratio	Coli.	Ent.
CARROT:									
Whole	12,000	< 3.0	46,000	<3.0	230,000	2,300	1:100	230,000	< 3.0
Leaves	240,000	< 3.0							
Whole	93,000	< 3.0	46,000	< 3.0					
Leaves	240,000	75							
ONION	4,600,000	< 3.0			93,000	930	1:100	7,500	43
"	23,000	64			230,000	4,300	1:53.5	23,000	230
MEDIAN					93,000	2,300	1:76.8	93,000	3.0

1 - Same source of water and of soil.

Table IV.

Coliform and Enterococcus Densities of Samples from Denver Sewage Disposal Plant

Date 1949	M.P.N. per 100 ml.								
	RAW SEWAGE			SETTLED SEWAGE			TREATED SEWAGE (EFFLUENT)		
	Coli.	Ent.	Ent:Coli Ratio	Coli.	Ent.	Ent:Coli Ratio	Coli.	Ent.	Ent:Coli Ratio
July 25	23,000,000	930,000	1:25	9,300,000	430,000	1:22	93,000	2,300	1:42
Aug. 9	23,000,000	230,000	1:100	15,000,000	230,000	1:65	< 300[a]	<3.0[a]	
29	43,000,000	430,000	1:100	23,000,000	150,000	1:153	15,000	2,300	1:7

a - Sample bottle did not contain sodium thiosulfate.

(a) All plates are incubated for 18 to 24 hours at 37° C.

(b) BS plates are incubated for an additional 24-hour period following examination and/or fishing of colonies after the first 24-hour period.

4. At least four suspicious or typical colonies are picked from each plate and transferred to Triple Sugar Iron Agar (TSI) stab-slant tubes.

5. After 24-hour incubation, large inocula of all suspicious cultures are transferred into urea broth.

6. Urea broth cultures are incubated at 37° C. and read after 4 hours. All urease positive cultures are discarded; urea broth tubes showing urease negative reactions are incubated further for at least 20 hours and preferably for 48 hours to rule out some of the paracolon bacteria, which may produce a delayed urease reaction.

7. All TSI tubes showing acid or acid and gas in butt, no change on slant, with or without production of H_2S, and which gave a negative urease reaction, are agglutinated with polyvalent or grouping Salmonella antiserums.

8. All TSI tubes showing acid in butt, no change on slant, with no production of H_2S, and which gave a negative urease reaction, are agglutinated with polyvalent grouping Shigella antiserums.

9. The cultures are then subjected to the following biochemical tests, either for confirmation or tentative identification if not agglutinable:

(a) Motility (Semi-Solid Agar).

(b) Indol production (Tryptone Broth).

(c) Citrate utilization (Simmons').

(d) Carbohydrate fermentation (Lactose, Saccharose Mannitol).

10. Following the establishment of the identity of the generic organism, it is sent to a central typing laboratory for species identification.

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3. Galton, Mildred M.; Hardy, Albert V.; Mitchell, Roland B., The Public Health Laboratory Diagnosis of Enteric Infections, AMERICAN JOURNAL OF TROPICAL MEDICINE, 30:77, 1950.

SUPPLEMENT TO APPENDIX "G"

Partial Review of Literature on the Public Health Aspects of Sewage-Laden Irrigation Water

1. Davidson (1), according to Wilson (9), reports an outbreak of typhoid and paratyphoid fever involving 65 cases in North Battleford, Saskatchewan, Canada, during the summer of 1941. Neither milk nor water could be incriminated as the agent of transmission. Inconclusive evidence indicated that the infection was spread by vegetables which were irrigated, and possibly washed, with water from a ditch into which the sewage works discharged its effluent.

2. Chapman (2) stresses the need for treatment of sewage discharged to streams from which water is taken to irrigate market produce. Investigations conducted by the Colorado State Board of Health have shown that vegetables, grown in fields many miles below the source of the pollution, contained large numbers of coliform bacteria. In many instances washing could not make them fit for human consumption. Some epidemiological evidence is presented. The death rate for typhoid fever, also for diarrhea and enteritis in infants and children up to 2 years of age, in Colorado is high when compared to that for the U. S. and several other western states. Colorado counties having polluted waters have death rates for the above infections almost twice those of counties in which there is little or no pollution of streams. Maps are presented which show that grossly polluted streams are closely associated with the counties having these higher death rates. Water and milk were not considered the infection source. It was recommended that fruits and vegetables grown under or close to the ground should not be irrigated with sewage polluted water. Although cooking may make eating such vegetables safe, it does not eliminate the possibility of introduction of infectious matter into the kitchen and its transfer to foodstuffs.

3. Lumsden and Anderson (3), in their investigation of the origin and prevalence of typhoid fever in the District of Columbia, found (3a) "a suggestively large portion of the typhoid cases in the District of Columbia had eaten lettuce, celery or strawberries during the 30 days prior to illness." They experienced difficulty in tracing the produce back to its source and therefore considered definite conclusions "not justifiable". They conclude (3b), however, that "In view of the insanitary conditions, particularly in respect to the lack of sanitary privies on farms which supply a large portion of the green vegetables and fruits distributed in Washington, it seems quite probable that those foodstuffs play some part, and for occasional periods perhaps a very considerable part, in the distribution of typhoid-fever infection in the District of Columbia". Furthermore, they recommend (3c), "The enactment of legislation prohibiting the sale or the offering for sale in the District of Columbia of ... any green garden truck obtained from farms not provided with either sanitary privies or sanitary water-closets."

4. Bundeson (4), reports that, following a typhoid outbreak in Chicago, which was eventually traced to oyster infection, special effort was made to determine the sources of certain vegetables, lettuce and watercress, served in hotels and restaurants, where it appeared the majority of cases had contracted the infection. This was found to be impossible since there was no common source for such produce. In connection with the investigation, bacteriological examination of fruits, vegetables and watercress were undertaken. Coliform bacteria were found but whether of human or other source was not determined. In one case high coli contamination of lettuce was traced to the ice in which it was packed. Need for greater attention to watercress is stressed. In the discussion of Bundesen's paper Dr. F. C. Johnson, a pediatrician, comments that based on his experience he has "advised not to feed lettuce or celery to children as the possibility of infections being carried by these raw vegetables is really great."

5. In the discussion (5) of Dr. Warry's report of an outbreak of enteric desease involving 110 cases in the borough of Hackney, England, it is noted that a high per cent of the cases had partaken of watercress within 3 weeks prior to the illness, and bacteriological examination of beds from which the watercress had been taken showed the presence of sewage organisms, in one case, as high as 50 coliform bacteria per cubic centimeter of water.

6. An article in the Journal American Medical Association (6) notes the raising of vegetables, frequently eaten raw, on the Paris, France sewage farm and associates the occurrence every year, from July to October, of typhoid fever in Paris with the marketing of these vegetables. "Clauditz found germs, after several days, on green herbs thus treated which a thorough washing could not remove. Dr. E. Marchoux, after an investigation, 'recommended that the kinds of herbs and vegetables that may be grown on sewaged land be established by law.'"

7. The American Society of Civil Engineers' committee on salvage of sewage (7) notes that in 1934 health officials in each of the 48 states and the District of Columbia were asked for information on the extent of sewage use for irrigation. Only 9 states, of the 40 replies received, admitted having experience with sewage irrigation and sewage irrigated crops. Significantly, "four were able to trace illness of an epidemic order to such use, whereas one other stated that cattle, pastured on a raw sewage irrigated field developed poorly and were infested with Cysticercus bovis". At that time (7a) "Only one of the nine was agreeable to the use of (sewage) treatment plant effluent on vegetables to be eaten raw", and that state prescribed practically potable water standards for such effluent. In summarizing, the committee states (7b) "Thus it would appear that, except for use upon vegetables to be eaten raw, an effluent from about that afforded by subsidence, trickling filters, and secondary subsidence effecting about 85% reduction in biochemical oxygen demand (B.O.D.) and suspended solids, followed by chlorination, should satisfy health requirements ..."

8. Roberts (8) noted 23 of 45 cattle fattened on the Tucson, Arizona, sewage farm were upon slaughtering found infested with the tape worm, Cysticercus bovis. Since these cattle apparently came from different sources - they all bore different brands - and such general infestation indicated a source common to all or most of them, it was concluded that the infestation resulted from drinking sewage polluted water.

9. Wilson (9) cites the experience at the Melborne, Australia, sewage farm where in 1937, 46% of the cattle grazed were found infested with Taenia saginata. The sale of these cattle was banned. During a six month survey of Melborne (1941-42) 100 cases of human tape worm infections were treated. He concludes, "In ... any town where large portions of the inhabitants are infested with tapeworm ... sewage and sewage sludge must present a real danger."

10. Under Annotations (10) it is noted that Leptospirosis is essentially an occupational disease. Human infection is acquired through the alimentary tract or by contact with contaminated water or other material. It has occurred "during the last few years among ... sewer workers in London and Glasgow ..., and workers in the beet fields in Ireland, who are probably infected through abrasions of the hands in the same way as are the sugar cane cutters in Queensland."

11. Mills et al. (11) conducted laboratory investigations to determine whether the bacteria penetrated the surface of fruits and vegetables. They found that although bacteria do not penetrate the uninjured surface, they may gain entrance through damaged or decayed surfaces and remain viable for from 7 to 42 days. They also demonstrated that bacteria may persist on the surface of fruits or vegetables kept moist for 15 or more days.

12. Klinger (12) investigated the survival and dispersion of typhoid and dysentery bacteria in soil. These bacteria were recoverable from artificially inoculated moist soil (pH 6.6-7.4) for 70 or more days, but were not recoverable in dry soil on the 20th day. They penetrated to a depth of 2, but not 3, feet in 40 days in relatively porous soil under a 1 to 2 inch head of water.

13. Melick (13) in three outdoor experiments, extending from May to September, isolated typhoid bacteria from garden soil 41, 34 and 35 days after inoculation with typhoid bearing excreta. Under hot house conditions old strains of typhoid bacteria survived for 74 days in garden soil enriched with sterile sewage; fresh strains survived only 49 days. In these experiments typhoid bacteria were found on radishes grown in infected soil 37, 28 and 35 days, and on lettuce after 21 days, after inoculation of the soil. The organism became attached to the surface and was not ordinarily removable by washing.

14. Creel (14) investigated the viability of typhoid bacteria on garden truck. He reports 3 experiments in which radishes and lettuce were raised on soil sprinkled with a fecal emulsion mixed with 24-hour old culture of typhoid bacteria 2 or 3 days after the planting.

He states, "that plants cultivated in contaminated soil will take up on the leaves and stems, as they grow through the soils, organisms existing therein.

"The Bacillus typhosus (typhoid bacillus) was recoverable from the tips of leaves that were, to the naked eye, free from soil and that when these vegetables were grown under natural conditions (except for the artificial inoculation of the soil) the infectious material could be isolated from the leaves up to 31 days.

"Rainfall will not free the vegetables from the infectious material."

15. According to Melick (13) "Morse (15) attributed 49 typhoid cases among inmates of an insane asylum to the eating of celery." Typhoid cases had occurred in the institution a few months previously, the celery had received the institutions sewage, and the epidemic occurred soon after the first use of the celery.

16. According to Melick (13) "Pixley (16) records 2 cases of typhoid from eating uncooked rhubarb, which was grown on soil known to be fertilized with typhoid bearing excreta."

17. Veatch (17a) in discussing the Denver, Colorado sewage disposal problem notes that on certain days the Denver sewage accounts for 97% of the flow of the South Platte River, which is used for irrigation immediately downstream. He refers to the construction at Denver in 1937 of a sewage treatment plant which included "fine grained rapid sand filters to secure a high rate of removal of suspended solids and incidentally the removal of ... the encysted type of amoeba (Endamoeba histolytica) which is strongly suspected of being responsible, through the medium of sewage irrigated vegetables, for a considerable amount of sickness in this area." (Abstractor's note: The magnetite filters referred to did not operate satisfactorily and their use was discontinued).

18. Tanner (18) points out that missed cases and carriers may always be present and that sewage should always be regarded as containing infectious organisms. The work of several investigators is cited and Tanner concludes that (18a) "Sufficient data ... have been recorded to justify the conclusion that polluted soil may infect vegetables grown on it." He adds (18b) that "good epidemiological evidence seems to exist in the literature to the effect that fresh vegetables may and have caused communicable diseases and that the sanitary condition of the soil from which they are harvested is important." - and finally (18c) that "This review of the literature quite clearly indicates that fresh vegetables which are raised on polluted soil may transmit pathogenic bacteria."

19. Rider (19) in commenting on irrigation in Arizona noted the insanitary practices of many camps of agricultural workers and the use of the main canals for drinking water, swimming, washing clothes, etc. In spite of such conditions only a few instances were noted where water borne diseases were attributed to canal water. Several years ago, as the result of newspaper syndicated articles, the state laboratory,

undertook bacteriological examination of lettuce. Many heads - from 16 fields in the Salt River Valley and from two in the Elroy district - were cultured but no evidence of typhoid or allied organisms was found. Although the technique used was rather hastily devised, it was felt any general contamination would have been indicated.

20. The Committee on Sewage Disposal, American Public Health Association (20) notes in 1937, that "California, alone, out of 33 states reporting, ... had adopted regulations under its Public Health Act whereby the disposal of sewage, sewage effluent or sludge for irrigation or fertilizing purposes" requires a permit from the State Board of Health. Briefly, these California regulations require that raw sewage shall not be used for irrigating growing crops, and settled or undisinfected sewage is banned for the irrigation of growing vegetables, garden truck, berries, or low-growing fruit, or for watering vineyards or orchards where windfalls or fruit lie on the ground.

21. The Committee on Utilization of Sewage Sludge as Fertilizer, Federation of Sewage Works Associations, in their report (21) in 1942, notes the California regulations are still in effect. Several other states regulate or advise regarding use of sewage sludge.

22. Rawn (22) notes that as of June, 1934, 39 states and the District of Columbia had replied to a questionnaire on use of sewage for irrigation. Thirty states reported neither sewage nor sewage-polluted waters were used for irrigation within their boundaries. Seventeen of these states reported they would not tolerate such use, and the other 13 found it repugnant.

"In the 9 states which admitted use of sewage for irrigation, the attitude was one of tolerance ... and rigid regulation of the production of the effluent as well as the nature of the crops for which it was to be used."

23. DeMartini (23) mentions the following regulations concerning irrigation with sewage and sewage-laden waters:

(1) Colorado - "Requires written permission of State Board of Health for use of sewage or sewage-polluted waters when Coli-aerogenes group of bacteria exceeds 10 per cc."

(2) California and Oregon - "Prohibit use of raw sewage for irrigating growing crops. Prohibit use of settled or undisinfected sewage effluents on growing vegetables and garden truck. Highly oxidized and disinfected sewage effluents can be used provided they meet drinking water standards in Oregon and in California if not over 10% of 10 cc. portions are positive for the Coli-aerogenes group. Also no single sample can be positive for over half of the 0.1 cc. portions examined."

24. Jensenand Jensen (24) made a literature survey on the occurrence of tubercle bacilli in sewage. They also performed some experiments on the occurrence of the bacilli in the sewage from various tuberculosis sanatoria. "The presence of living, virulent, tubercule bacilli in not inconsiderable numbers as a constant finding in sewage from tuberculosis hospitals and sanatoria." In plant scale experiments on the disinfection of sewage from a tuberculosis sanatorium--"It was found that the sewage constantly contained numerous virulent tubercle bacilli." "Activated sludge plants do not reduce the number of tubercle bacilli appreciably." Destruction of these organisms is accomplished only by the addition of 10 ppm chlorine.

25. Heukelekian and Pramer (25) developed a method for the differential enumeration of tubercle bacilli in sewage. The method consists of heat treating sewage at 50 degrees C. for one-half hour and plating on Dubos agar fortified with penicillin and grisein.

26. Brown, Petroff and Heise (26) studied the occurrence of tubercle bacilli in the waters of the Saranac River below the point of discharge of the sewage for the community of Saranac Lake, New York. They found acid fast bacilli in the water 3 miles below the point of entry of the sewage and on days when the sun was not shining these acid fast organisms were capable of producing tuberculosis in guinea pigs. When no particles of feces were found in the water no viable tubercle bacilli were found.

27. Falk (27), based on a study of tomatoes grown in polluted soil, states that they were subject to "no abnormal gross contamination." He further states that even when "sprayed with fecal suspensions, surface coliform counts were no greater after one month than on control tomatoes" and that "failure to find Salmonella cerro 7 days after its application to growing tomatoes upholds the contention that organisms of fecal origin will not be present in sufficient numbers to cause gross contamination." On the basis of his experimental work Falk concluded that the growth of tomatoes on soil fertilized by night soil or sewage sludge would not be likely to result in the transmission of human bacterial enteric diseases even if the tomatoes are consumed raw.

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APPENDIX "H"

Project Effects on Low-Flow Conditions in the South Platte River Basin

In order to appraise the effects from the anticipated operations of the Blue-South Platte and the Colorado-Big Thompson Projects, a request was made of the Bureau of Reclamation for information on probable minimum stream flows.

In the matter of the Blue-South Platte Project, the estimated flows are based upon the best available information concerning this project at the time the estimates were made. In that this project is still in the planning stage, the estimated effects are subject to considerable variation as the final plans have not been decided upon. Further, a reservoir project has recently been authorized for construction by the Corps of Engineers, U. S. Army, for flood control purposes. This reservoir will be located on the South Platte River immediately above Littleton and below all reservoirs contemplated for the Blue-South Platte River Project. The inclusion of this authorized reservoir will no doubt vary the anticipated operation of the Blue-South Platte Project to a greater or lesser extent. At the time of compiling this report (June 1950), hearings are being held on the final allocation of water from the Colorado River Basin to this project. As a result of these hearings, it may be that the amounts of water to be diverted will be somewhat less than those now anticipated.

In regard to the Colorado-Big Thompson Project, the final allocation of water to the various portions of the project has not been completed. At the time of preparing this report, this project was well on the way towards completion and, in all probability, will be in operation within the next two or three years. It is anticipated that the total water resources available from this project will be somewhat less than that originally contemplated. The full effects of this decrease are not now apparent.

With the above prefatory remarks, there is quoted below a discussion prepared by the South Platte River District Office of the Bureau of Reclamation covering their thinking at this time on the probable minimum stream flows to be expected in the South Platte River Basin as a result of their anticipated plan for combined operation of the above projects.

"Reference is made to our conversation in April concerning the minimum flows at critical points on the South Platte River and its tributaries after development of the Blue-South Platte, the Colorado-Big Thompson, and Narrows Reservoir Projects. It was stated at that time that it is only possible to estimate the effect of these projects,and revisions in plans or assumptions made may change the estimates considerably. The final allocation of Colorado-Big Thompson Project water supply among the St. Vrain, Big Thompson, and Poudre Rivers has not been made, and any change in allocation from that anticipated would affect the quantity of water delivered to the various streams. Potential projects such as the Blue-South Platte are subject to considefable revision before construction.

Under present plans the Blue-South Platte Project would deliver additional water to Bear, Clear, South Boulder, and Boulder Creeks as well as the South Platte River. Minimum flows after project development were analyzed at the point of delivery on Clear Creek and Boulder Creek as well as critical points along the South Platte River.

Project deliveries to Clear Creek would be made below Golden, Colorado, just north of South Table Mountain. It is anticipated that an average of 55,000 acre-feet annually would be delivered to Clear Creek or directly to canals supplied from Clear Creek. If no additional storage is constructed in the area, deliveries would be made during the irrigation season. In this event the minimum flow in Clear Creek at the point of delivery would be 400, 150, 100, and 50 second-feet during June, July, August, and September, respectively. The additional water would be diverted by the existing ditches and would not increase the flow at the mouth appreciably. However, if additional storage reservoirs are constructed in the unit, deliveries would be made almost entirely during the winter months at an average rate of 125 second-feet. With this method, the water would not be delivered to Clear Creek but to the reservoirs directly.

Only a small portion of the project supply would be delivered directly to Boulder Creek. The majority of the supplemental water would be delivered to South Boulder Creek or directly to the ditches. The increased flow in Boulder Creek would average 25 second-feet during the summer months. All of this water would be rediverted from the stream above the confluence with South Boulder Creek.

The flow of the South Platte River at Denver would ordinarily be decreased during the early summer months under project development. Since increased return flows would assure filling of downstream storage during the winter months and supply a large part of the summer demands, it would be possible to withhold water at Two Forks during the early summer. The estimated minimum future flows at the Denver gage are shown below:

Future minimum flows of South Platte River at Denver gage
(Second-feet)

January.	108	July	171
February	102	August	128
March.	77	September. . . .	221
April.	69	October.	18[illegible]
May.	55	November	123
June	50	December	91

Minimum flows below the Burlington Ditch headgate would not be increased appreciably by project operation.

It is not anticipated that the flow at the Ft. Lupton gage would be affected materially. The estimated minimum flows after project development at this point are tabulated below:

Future minimum flows of South Platte River at Ft. Lupton
(Second-feet)

January	66	July	43
February	77	August	37
March	52	September	30
April	36	October	10
May	68	November	20
June	37	December	75

"The Colorado-Big Thompson Project will deliver project water to the Cache la Poudre River, Big Thompson River, and St. Vrain Creek, and possibly Boulder Creek.

"It is anticipated that project water will be delivered only in the months June through October. The water supply studies show that, in general, there has been little shortage of irrigation water before June in the past, making the above assumption valid.

"According to a contract with the Northern Colorado Water Conservancy District, the Bureau is to deliver project water at four delivery points: the Cache la Poudre River at a point approximately eight miles upstream from Fort Collins and above the diversion of the Poudre Valley Canal but below the North Poudre Canal diversion point; the Big Thompson River at a point approximately eight miles upstream from Loveland and immediately above the diversion point of the Handy Ditch; the Little Thompson River at a point near Lyons above all irrigation diversion points; and the St. Vrain River at a point near the western city limits of Lyons.

"The average increase in the flows in the various streams, at the point of delivery mentioned above, is shown in the following table. The increases in flows are based on the 28-year average, 1920-1947, from the utilization studies of the revised report of the Colorado-Big Thompson Project.

Table 1.--Increase in stream flow due to Colorado-Big Thompson operation

Month	Cache la Poudre River at delivery point		Big Thompson River at delivery point		Little Thompson River at delivery point		St. Vrain Creek at delivery point	
	Acre-feet for month	Average cfs	Acre-feet for month	Average cfs	Acre-feet for month	Average cfs	Acre-feet for month	Average cfs
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
June	10,822	180	9,300	155	603	10	9,433	157
July	25,889	431	12,800	213	609	10	9,547	159
Aug.	31,875	531	16,821	280	993	17	15,553	259
Sept.	23,500	392	13,275	221	796	13	12,475	208
Oct.	12,184	203	4,854	809	266	4	4,174	70

"The values given in the above table represent the average increase from project operation, as nearly as can be determined, at the immediate point of delivery. There will be no increase at these points in the months November through May since all return flow will appear below these points. The increase below the points of delivery will vary, depending upon the amount of project water diverted above any particular point and upon how much flow from project water has returned to the stream above that point.

"Column 2 of Table 1 shows the amount of increase in the Cache la Poudre for the summer months at the point of delivery. This quantity represents only 76 percent of the water delivered to the area tributary to the Cache la Poudre. Twenty-four percent of the water delivered to this area would be taken by the North Poudre and Poudre Valley Canals which would receive the water direct or by exchange from the Poudre Supply Canal and would not help to increase the flow of the river at this point.

"At Various Points on the Stream.--The flows of the streams in the project area will be increased to some extent by project operation. The degree of this increase will depend on several factors. In the winter months, November through May, the increase will depend on the amount of return flow from project water that comes back to the stream above the point in question and the amount of this return flow can be rediverted by existing reservoir systems above this point. During the irrigation season, June through October, the increases will depend on the following factors: the quantity of project water delivered to the stream, the quantity of project water diverted above the point in question, the amount of return flow from project water above the point, and the amount of this return flow that can be rediverted above this point by existing systems.

"There is no exact method for determining the increase due to project operation at various points on the stream. However, by using maps of the area, the estimated allotment percentages for the various ditches, and the data from the utilization studies, an estimate of these increases at certain points is shown in Table 2.

Table 2 Increased Flows Resulting from Colorado-Big Thompson Project - Unit cfs

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cache la Poudre River at Ft. Collins, Colo.	2	2	2	2	3	38	84	108	82	45	3	2
Big Thompson River at Loveland, Colo.	7	7	7	5	7	35	47	58	50	25	7	7
Little Thompson River at mouth	0	0	0	0	0	2	2	2	2	2	2	0
St. Vrain Creek at Longmont, Colorado	8	8	8	8	8	12	10	12	12	12	8	10

Past reservoir records were examined and an estimate made of the approximate quantity of winter return flow, from project water, that could be diverted, and these potential diversions are reflected in the estimated future increased flows.

"The flow of the South Platte River at the Kersey gaging station will be affected by both the Colorado-Big Thompson and Blue-South Platte Projects. The estimated minimum flows are shown below:

Future minimum flow of the South Platte River at the Kersey gage
(Second-feet)

January	92	July	106
February	89	August	117
March	77	September	104
April	57	October	82
May	118	November	96
June	115	December	96

"With construction of the Narrows Reservoir, it is anticipated that the minimum flows will be as shown below:

Minimum flow of South Platte River below Narrows Reservoir
(Second-feet)

January	34	July	153
February	35	August	190
March	34	September	181
April	47	October	37
May	228	November	30
June	654	December	33"

APPENDIX "J"

LABORATORY DATA
SUMMARY OF INDIVIDUAL RESULTS

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River Bridge at Littleton gage	SP 314.4	1948 12/29	71	1.		11.2	95.	1.8	7.1	-	-	-	4,300
		1949 1/10	97	0		11.4	94.	2.0	7.4	-	-	-	930
		1/13	124	2.		10.9	95.	1.3	7.6	-	-	0.12	430
		1/17	106	1.		11.3	96.	.9	7.6	-	-	.10	230
		1/20	158	1.		10.9	95.	.9	7.9	-	-	.06	430
		1/31	190	1.		11.1	94.	1.1	7.6	-	-	.06	430
		2/3	233	-1.		10.9	92.	1.2	8.0	148	182	.06	430
		2/7	290	1.		10.6	92	-	-	-	-	-	430
		2/14	210	1.		10.9	94.	1.8	7.6	-	-	-	930
		2/21	82	3.		11.2	103.	1.9	7.9	-	-	-	2,300
		2/24	80	4.		11.5	108.	1.4	7.9	-	-	-	4,300
		2/28	60	4.		11.4	106.	1.4	7.8	-	-	-	4,300
		3/3	72	6.		11.7	115.	1.8	7.9	-	-	-	2,300
		3/7	70	7.		10.5	106.	1.4	7.8	-	-	-	1,500
		3/10	79	2.		11.7	106.	5.8	7.8	-	-	-	2,300
		3/14	49	5.		11.	106.	1.0	7.8	-	-	-	930
		3/17	72	6.	118	11.	108.	1.5	7.8	-	-	-	930
		3/21	74	8.		10.8	112.	.5	7.6	-	-	-	430
		3/24	47	6.		10.9	108.	1.2	7.7	-	-	-	930
		3/28	40	5.		10.5	101.	1.0	7.6	142	142	.08	750
		3/31	47	6.		11.4	113.	3.1	7.9	-	-	.06	930
		4/4	50	8.		11.2	114.	1.5	-	-	-	-	930
		4/7	70	11.		10.	110.	1.0	8.0	-	-	-	930
		4/11	100	7.		10.9	110.	2.2	7.8	108	129	-	430

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity ppm.	Dissolved Oxygen ppm.	Dissolved Oxygen % Sat.	5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
South Platte River Bridge at Littleton Gage (Cont)	SP 314.4 (cont)	4/14	126	5.		10.1	97.3	3.8	7.8	102	138	0.14	2,300
		4/18	151	11.		9.4	104	2.2	8.1	102	138	.12	430
		4/21	60	11.		9.2	102.	1.4	7.8	136	161	.04	23,000
		4/25	74	15.		8.9	108.	1.2	8.0	-	-	-	43,000
		4/28	96	12.		9.3	107.	3.3	7.9	-	-	-	23,000
		5/2	100	13.		8.7	101.	1.1	8.4	-	-	-	4,300
		5/5	273	11.	93	8.6	95.5	1.1	7.9	-	-	-	23,000
		5/9	154	13.	158	8.8	102.	1.0	7.8	108	184	.08	2,300
		5/12	978	12.		-	-	-	-	-	-	-	230,000
		5/16	964	13.		9.	105.	.9	-	-	-	-	23,000
		5/19	677	13.		7.9	92.1	3.3	7.8	-	-	-	2,300
		5/23	360	14.		8.6	102.	.9	-	-	-	-	2,300
		5/26	270	16.		6.1	75.1	1.1	-	-	-	-	1,500
		6/2	526	12.		8.9	100.	1.1	7.7	-	-	-	930
		6/6	2430	13.		8.2	95.1	3.4	8.0	-	-	-	23,000
		6/27	2240	17.		7.3	92.4	.7	7.7	-	-	-	3,900
		7/7	1605	18.		7.5	95.	1.0	7.6	-	-	-	23,000
		7/14	1722	18.		7.5	95.	.7	-	-	-	-	2,300
		7/20	1068	19.		7.3	95.	.9	7.9	-	-	-	390
		7/27	1050	19.		7.4	96.	1.6	8.0	-	-	-	4,300
		8/11	439	18.		7.2	93.3	.5	7.9	-	-	-	43,000
		8/18	338	16.		7.8	96.9	.5	-	-	-	-	9,300
		8/25	254	17.		7.4	93.7	.6	-	-	-	-	4,300
		8/29	221	15.		7.9	96.2	.6	-	-	-	-	9,300
South Platte River. Evans Ave. Bridge, Denver.	SP 309.3	1948 12/29	83	4.		11.5	106	1.2	7.2	-	-	-	43,000
		1949 1/5	130	8.		9.6	98	6.5	8.0	-	-	.1	43,000
		1/10	105	3.		11.7	104	1.5	7.4	-	-	.08	9,300
		1/13	108	3.		10.4	94	2.0	7.5	-	-	.18	9,300

		1/17	95	2.		11.7	102.	1.3	7.8	-	-	-	23,000
		1/20	77	0		11.3	93.	1.4	7.8	209	227	0.08	43,000
		1/31	75	1.		11.7	99.	1.8	7.8	-	-	.10	23,000
		2/3	75	0		11.	91.	1.8	8.0	192	205	.1	9,300
		2/7	77	2.		11.2	98.	-	7.9	-	-	.04	9,300
		2/14	70	1.		11.2	95.	2.1	7.9	-	-	-	43,000
		2/21	70	4.		11.	101.	2.4	7.7	-	-	-	43,000
		2/24	128	4.		11.6	107.	1.5	7.8	-	-	-	4,300
		2/28	89	4.		11.6	106.	1.8	7.6	-	-	-	9,300
		3/3	88	6.		11.6	112.	2.3	7.8	-	-	-	23,000
		3/7	87	7.		11.	109.	2.2	7.8	-	-	-	23,000
		3/10	103	2.		10.9	96.5	2.2	7.8	-	-	-	15,000
		3/14	82	6.		11.	106.	3.8	7.9	-	-	-	23,000
		3/17	94	6.	67	11.	106.	1.7	7.9	-	-	-	9,300
		3/21	88	8.		11.1	112.	2.8	7.8	-	-	-	15,000
		3/24	71	6.		10.6	102.	2.1	7.9	-	-	-	43,000
		3/28	64	5.		10.3	97.	4.1	7.8	184	184	.16	43,000
		3/31	71	6.		12.1	117.	6.5	8.1	-	-	.18	4,300
		4/4	80	8.		12.8	129.	2.2	-	-	-	-	12,000
		4/7	88	11.		11.7	127.	.8	8.2	-	-	-	2,300
		4/11	126	8.		11.4	116.	4.5	7.9	140	161	-	23,000
		4/14	150	7.		9.5	94.1	3.3	7.6	116	184	.12	23,000
		4/18	174	10.		9.7	104.	3.2	7.9	120	138	.1	4,300
		4/21	72	12.		10.2	114.	1.5	7.8	160	161	.04	29,000
		4/25	84	16.		10.2	123.	1.3	8.1	-	-	-	23,000
		4/28	106	12.		9.3	105.	3.4	7.9	-	-	-	2,300
		5/2	110	14.		9.4	110.	1.0	8.0	-	-	-	9,300
		5/5	284	11.	85	8.6	93.8	1.2	7.7	-	-	-	15,000
		5/9	165	12.	125	9.0	101	1.2	7.6	136	184	.06	15,000
		5/12	1860	12.		-	-	-	-	-	-	-	23,000
		5/16	1310	14.		8.8	102	4.5	-	-	-	-	15,000
		5/19	1280	13.		8.1	91.8	14.	7.7	-	-	-	3,900
		5/23	518	13.		8.4	95.7	1.9	-	-	-	-	9,300
		5/26	400	17.		6.	73.9	1.2	-	-	-	-	2,300
		6/2	605	11.		9.	97.7	1.1	7.7	-	-	-	7,500
		6/6	3000	13.		8.2	93.4	1.9	7.9	-	-	-	7,500
		6/27	2155	19.		7.3	94.5	.8	7.8	-	-	-	9,300
		7/7	1410	18.		7.5	94	1.0	7.6	-	-	-	9,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River Evans Ave. Bridge, Denver (Cont.)	SP 309.3 (Cont)	7/14	2120	19.	-	7.5	97	0.8	-	-	-	-	23,000
		7/20	1185	20.		7.4	97	.7	7.9	-	-	-	39,000
		7/27	1215	20.		7.5	98	1.8	8.	-	-	-	15,000
		8/11	560	18.		7.8	98.7	.8	8.	-	-	-	23,000
		8/18	460	16.		8.2	100	.9	-	-	-	-	23,000
		8/25	320	18.		8.3	105	1.7	-	-	-	-	9,300
		8/29	245	15.		8.7	104	1.1	-	-	-	-	15,000
South Platte River 19th Street Gage, Denver	SP 302.3	1948 12/29	120	7.		9.2	91	5.0	7.3	-	-	-	7,500
		1949 1/10	120	4.		9.9	91	4.8	7.5	-	-	0.08	9,300
		1/13	123	9.		9.1	95	9.9	7.3	-	-	.16	9,300
		1/17	110	9.		9.1	94	2.8	7.9	-	-	.14	15,000
		1/20	92	7.		9.2	91	4.1	8.	202	227	.10	23,000
		1/31	90	5.		9.8	93	3.1	7.8	-	-	.12	2,300
		2/3	90	5.		8.9	84	3.2	7.8	206	228	.08	23,000
		2/7	92	9.		9.5	99	-	8.	-	-	.06	1,500,000
		2/14	85	10.		8.9	95	4.6	7.9	-	-	-	43,000
		2/21	145	10.		9.4	100	3.6	8.2	-	-	-	43,000
		2/24	143	9.		10.	104	3.5	7.9	-	-	-	15,000
		2/28	112	10.		9.9	105	3.3	7.8	-	-	-	23,000
		3/3	114	12.		9.8	109	2.9	7.9	-	-	-	4,300
		3/7	125	14.		8.9	104	5.6	7.9	-	-	-	15,000
		3/10	122	9.		10.	104	2.7	7.8	-	-	-	43,000
		3/14	94	11.		9.6	105	5.6	8.	-	-	-	23,000
		3/17	108	12.	50	11.	123	4.6	8.1	-	-	-	23,000
		3/21	108	14.		8.9	104	4.5	8.	-	-	-	9,300
		3/24	106	13.		8.	90.7	>7.6	8.	-	-	-	15,000
		3/28	104	12.		8.2	91	4.7	8.	190	190	.16	93,000
		3/31	88	11.		6.7	72.8	3.8	8.3	-	-	.08	93,000
		4/4	96	11.		10.3	112	3.7	-	-	-	-	430,000

		4/7	116	15		9.4	112	4.3	8.3	-	-	-	4,300
		4/11	188	12		9.4	103	2.8	8.1	154	161	-	93,000
		4/14	206	9		8.7	90.5	3.8	7.8	144	184	0.18	21,000
		4/18	217	14		8.7	101	5.3	8.1	128	138	.12	43,000
		4/21	85	18		8.1	102	15.	8.	168	207	.06	9,300
		4/25	93	20		7.3	96	7.6	8.1	-	-	-	93,000
		4/28	217	15		8.4	99.5	4.7	8.	-	-	-	23,000
		5/2	126	18		1.	12.1	7.7	8.6	-	-	-	93,000
		5/5	290	13	155	6.7	76.1	>13.	7.6	-	-	-	230,000
		5/9	176	16	110	8.4	102	2.6	7.8	156	230	.04	7,500
		5/12	2300	13		-	-	-	-	-	-	-	43,000
		5/16	1412	14		8.3	96.3	2.4	-	-	-	-	23,000
		5/19	1386	15		8.1	96.4	12.	7.7	-	-	-	9,300
		5/23	640	15		8.3	98.8	2.3	-	-	-	-	4,300
		5/26	440	19		5.5	70.5	2.3	-	-	-	-	15,000
		6/2	696	14		8.7	102	2.2	8.1	-	-	-	23,000
		6/6	3252	14		8.2	95	1.8	7.9	-	-	-	15,000
		6/13	6952	16		6.4	77.8	2.3	7.8	-	-	-	23,000
		6/27	2180	20		7.8	102	1.4	7.5	-	-	-	9,300
		7/7	1360	19		7.5	97	1.5	7.5	-	-	-	43,000
		7/14	2180	20		7.2	95	1.7	-	-	-	-	15,000
		7/20	1210	20		7.5	99	1.2	8.2	-	-	-	43,000
		7/27	1240	21		6.6	88	2.5	8.2	-	-	-	43,000
		8/11	565	21		7.5	101	2.8	-	-	-	-	23,000
		8/18	463	19		7.	90.4	2.6	-	-	-	-	9,300
		8/25	335	21		7.7	104	2.4	-	-	-	-	150,000
		8/29	278	17		8.2	102	4.6	-	-	-	-	43,000
South Platte River - 40th Street Bridge, Denver	SP 300.0	1948 12/29	No data	10		9.4	100	7.6	7.3	-	-	.14	2,400
		1949 1/5	155	6		9.2	90	8.	8.	-	-	.14	15,000
		1/10	130	5		10.	95	6.8	7.6	-	-	.10	93,000
		1/13	133	8		9.	92	5.5	7.3	-	-	.16	9,300
		1/17	120	7		9.6	95	7.7	7.9	-	-	.22	21,000
		1/20	102	4		9.5	87	7.4	7.9	-	-	.10	21,000
		1/31	100	4		10.	92	5.	7.8	-	-	.12	21,000
		2/3	100	4		9.3	85	5.6	7.8	214	-	.1	23,000
		2/7	102	8		9.7	91	-	7.8	-	-	.08	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -40th Street Bridge, Denver (Cont.)	SP 300.0 (Cont.)	2/14	95	7		9.1	90	8.1	7.9	-	-	-	43,000
		2/21	155	10		9.2	98	5.9	7.7	-	-	-	9,300
		2/24	153	8		9.6	97	6.6	7.8	-	-	-	15,000
		2/28	122	9		10	103	3.6	7.8	-	-	-	9,300
		3/3	124	11		9.6	105	6.	7.9	-	-	-	9,300
		3/7	135	12		8.3	92.3	>7.2	7.8	-	-	-	43,000
		3/10	132	8		8.6	87.5	>7.2	7.7	-	-	-	9,300
		3/14	104	11		10	110	6.6	8.	-	-	-	23,000
		3/17	118	10	70	10.	107	14.	8.1	-	-	-	23,000
		3/21	116	12		9.	99.9	6.4	8.	-	-	-	23,000
		3/24	114	11		7.6	82.7	>29.	8.	-	-	-	150,000
		3/28	98	10		7.9	84.2	11.	7.9	198	198	0.16	23,000
		3/31	98	10		8.9	95.2	7.9	8.1	-	-	.12	93,000
		4/4	106	11		9.8	106	6.5	-	-	-	-	43,000
		4/7	126	16		10.1	122	8.8	8.2	-	-	-	15,000
		4/11	198	11		9.3	101	5.4	7.8	150	184	-	43,000
		4/14	216	9		8.	82.9	4.8	7.6	136	184	.18	9,300
		4/18	230	14		8.2	95.9	2.3	8.1	196	207	.12	43,000
		4/21	95	17		7.	87.5	18.	7.8	174	184	.10	23,000
		4/25	103	17		6.8	84.1	7.	7.8	-	-	-	23,000
		4/28	232	16		7.9	9[illegible]	8.	7.9	-	-	-	230,000
		5/2	136	17		5.6	69	9.2	7.9	-	-	-	150,000
		5/5	300	13	165	5.8	66	22.	7.5	-	-	-	430,000
		5/9	186	17	120	6.5	80.6	7.2	7.5	156	230	.1	2,300
		5/12	2310	13		-	-	-	-	-	-	-	93,000
		5/16	1425	15		-	-	-	-	-	-	-	23,000
		5/19	1400	15		7.8	93.2	9.8	7.7	-	-	-	43,000
		5/23	650	15		7.4	87.8	3.2	-	-	-	-	43,000
		5/26	450	18		4.3	54.9	4.2	-	-	-	-	23,000
		6/2	700	13		8.1	92.7	2.	7.8	-	-	-	230,000
		6/6	3270	14		8.1	94.8	>14.	7.7	-	-	-	9,300

		6/13	6970	15		6.2	74.2	1.9	7.7	-	-	-	9,300
		6/27	2190	21		7.6	103	.9	7.2	-	-	-	4,300
		7/7	1370	19		7.4	96	3.7	7.5	-	-	-	23,000
		7/14	2190	20		7.6	100	3.1	-	-	-	-	4,300
		7/20	1220	21		7.1	95	1.7	8.1	-	-	-	23,000
		7/27	1250	20		7.2	93	1.7	8.	-	-	-	43,000
		8/4	510	20		6.9	91.2	3.5	-	-	-	-	23,000
		8/11	575	20		7.1	93.5	2.3	-	-	-	-	75,000
		8/18	473	20		4.9	64.8	4.2	-	-	-	-	23,000
		8/25	345	20		7.	92.5	4.6	-	-	-	-	230,000
		8/29	288	18		7.8	99	-	-	-	-	-	9,300
		10/24	185	10		9.3	99	7.4	7.9	-	-	-	23,000
		10/31	210	8		10.6	106	3.1	-	-	-	-	43,000
		11/3	(No)	10		9.6	102	4.1	-	-	-	-	23,000
		11/10	(Data)	10		9.4	99.4	3.7	-	-	-	-	43,000
		11/17	( )	11		4.5	49	14	8.	-	-	-	93,000
		12/1	130	12		7.6	84.7	4.1	-	-	-	-	4,300
South Platte River -below Denver Sewage Treatment Plant	SP 299.L	1948											
		12/29	184	12		4.1	45	282	7.3	-	-	-	91
		1949											
		1/5	205	11		4.9	54	171	7.6	-	-	>0.14	4,300
		1/10	186	9		4.3	45	120	7.4	-	-	.26	230
		1/13	191	8		4.7	48	144	7.4	-	-	.26	230
		1/17	177	9		4.1	43	132	7.7	-	-	.20	430
		1/20	159	8		4.9	49	134	7.7	214	205	.20	930
		1/31	157	6		4.5	43	115	7.6	-	-	.24	2,400,000
		2/3	157	5		7.4	69	53	7.7	212	-	.12	43,000
		2/7	160	8		8.3	84	-	7.9	-	-	.12	23,000
		2/14	152	9		4.8	50	100	7.6	-	-	-	4,600,000
		2/21	212	10		5.5	59	69	7.5	-	-	-	4,600,000
		2/24	209	8		8.4	86	55	7.8	-	-	-	21,000
		2/28	178	11		5.3	58	92	7.5	-	-	-	280
		3/3	180	11		8.6	93.8	32	7.7	-	-	-	93,000
		3/7	252	12		6.2	67.9	42	7.5	-	-	-	1,500
		3/10	246	9		6.4	66.7	77	7.7	-	-	-	230,000
		3/14	226	10		5.1	54.9	85	7.5	-	-	-	930
		3/16	217	11		-	-	46	7.3	-	-	-	-
		3/17	234	10	141	5.8	62.8	66	7.8	-	-	-	15,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -below Denver Sewage Treatment Plant (Cont.)	SP 299.L (Cont.)	3/21	236	12		4.5	50.5	144	7.8	-	-	-	4,300
		3/24	237	12		3.8	41.9	>140	7.5	-	-	-	23,000
		3/28	214	10		4.5	47.8	85	7.6	213	213	-	230
		6/27	2310	19		5.2	66.5	50	6.9	-	-	-	930
		7/7	1490	19		3.3	43	>70	7.6	-	-	-	43,000
		7/14	2307	19		5.2	67	74	-	-	-	-	930
		7/20	1342	21		4.2	56	92	7.5	-	-	-	9,300
		7/27	1367	21		6.2	84	20	7.4	-	-	-	Indeterm.
		8/4	627	20		5.4	71.4	20	7.8	-	-	-	Indeterm.
		8/11	692	21		4.6	62.4	54	7.5	-	-	-	11,000,000
		8/18	595	20		5.	66.	58	-	-	-	-	230
		8/25	450	21		4.6	61.8	34	-	-	-	-	91
		8/29	390	18		5.4	67.8	12	-	-	-	-	230
		10/24	271	15		6.5	78	12	7.2	-	-	-	Indeterm.
		10/31	324	12		6.4	70.7	16	-	-	-	-	36
		11/3	No data	15		5.5	65	36	-	-	-	-	2,300
		11/10		14		5.5	63.6	30	-	-	-	-	93,000
		11/17	No data	14		3.9	45	>12	7.6	-	-	-	4,300
		12/1		14		5.5	64	64	-	-	-	-	430
South Platte River -below Denver Sewage Treatment Plant	SP 299.R	1948 12/29	184	11		8.3	90	45	7.4	-	-	-	43,000
		1949 1/5	205	8		7.9	81	41	8.7	-	-	0.18	430,000
		1/10	186	6		7.6	74	140	7.6	-	-	.26	430,000
		1/13	191	9		7.6	79	66	7.4	-	-	.12	240,000
		1/17	177	7		7.5	75	98	8	-	-	.25	930,000
		1/20	159	6		6.9	67	96	7.9	215	250	.14	230,000
		1/31	157	8		7.5	76	127	7.7	-	-	.24	430,000
		2/3	157	4		7.7	70	63	7.9	222	-	.16	430,000
		2/7	160	8		8.2	84	-	7.9	-	-	.12	930,000
		2/14	152	7		7.2	72	102	7.9	-	-	-	230,000

		2/21	212	11		8.1	89	58	7.8	-	-	-	210,000
		2/24	209	8		8.4	87	30	7.7	-	-	-	430,000
		2/28	178	10		8.9	95	43	7.8	-	-	-	93,000
		3/3	180	11		8.2	89.4	46	7.7	-	-	-	43,000
		3/7	252	12		7.3	81.8	28	7.3	-	-	-	430,000
		3/10	246	8		8.4	85.6	37	7.7	-	-	-	43,000
		3/14	226	10		9.3	100	46	7.8	-	-	-	93,000
		3/16	217	10		-	-	27	7.6	-	-	-	-
		3/17	234	10	88	9.5	101	36	8	-	-	-	21,000
		3/21	236	12		9	100	19	7.9	-	-	-	23,000
		3/24	237	11		6.7	73.1	46	7.8	-	-	-	430,000
		3/28	214	10		7.4	78.5	20	7.9	211	211	-	43,000
		6/27	2310	19		7.7	100	5.8	7.3	-	-	-	9,300
		7/7	1490	20		7.3	97	10	7.6	-	-	-	15,000
		7/14	2307	18		7.4	94	10	-	-	-	-	43,000
		7/20	1342	20		6.8	91	6	7.8	-	-	-	93,000
		7/27	1367	20		5.7	75	17	7.6	-	-	-	4,600,000
		8/4	627	20		4.9	64.5	31	7.4	-	-	-	11,000,000
		8/11	692	21		4.5	60.6	33	7.6	-	-	-	930,000
		8/18	595	19		5	64.6	32	-	-	-	-	Indeterm.
		8/25	450	22		2.3	31.5	95	-	-	-	-	Indeterm.
		8/29	390	18		3.9	49.6	70	-	-	-	-	4,600,000
		10/24	271	11		7.9	87	47	7.9	-	-	-	2,400,000
		10/31	324	8		9	90.8	21	-	-	-	-	23,000
		11/3	No data	11		8.5	92.2	7.2	-	-	-	-	43,000
		11/10		11		8.6	93.3	11	-	-	-	-	430,000
		11/17	No data	12		8.4	93	5.2	7.7	-	-	-	230,000
		12/1		12		6.6	73.5	26	-	-	-	-	430
South Platte River - Gardner's Ditch Intake	SP 298.2	6/2	4	13		5.2	59.7	45	7.2	-	-	-	39,000
		6/6	4	14		7.7	89.6	4.4	7.7	-	-	-	230,000
		6/13	4	16		5.3	64.1	18	7.5	-	-	-	430,000
		6/20	4	17		6.9	85.2	7.1	7.2	-	-	-	2,400,000
		6/29	4	18		6.7	84.8	10	7.1	-	-	-	9,300
		7/11	4	19		7.1	92	12	7.4	-	-	-	2,300
		7/21	4	20		5.3	71	22	7.4	-	-	-	Indeterm.
		7/25	4	21		6.1	82	8.8	7.5	-	-	-	4,300
		8/4	4	21		5.4	72	18	7.6	-	-	-	230,000
		8/8	4	20		5.9	77.2	11	-	-	-	-	2,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -Gardner's Ditch Intake (Cont.)	SP 298.2 (Cont.)	8/24	4	22		4.3	58.3	29	-	-	-	-	230,000
		9/1	4	16		5.2	63.5	23	-	-	-	-	230,000
		9/7	4	18		5.6	72	24	-	-	-	-	150,000
South Platte River -bridge near Welby, Colo.	SP 295.5	1/5	112	5		7.4	70	39	7.7	-	-	0.12	23,000
		1/10	42	4		8.8	81	22	7.8	-	-	.14	43,000
		1/13	27	6		7.6	73	28	7.4	-	-	.16	9,300
		1/17	38	4		8.3	77	17	7.8	-	-	.20	43,000
		1/20	29	4		7.2	66	23	7.6	275	273	.08	150,000
		1/31	37	3		7.4	66	20	7.4	-	-	.08	23,000
		2/3	36	4		6.1	56	24	7.6	278	-	.08	43,000
		2/7	79	7		6.1	60	-	7.6	-	-	.08	43,000
		2/14	96	5		6.6	62	29	7.4	-	-	-	4,600,000
		2/21	103	7		7.3	72	23	7.6	-	-	-	930,000
		2/24	53	5		7.8	73	26	7.3	-	-	-	43,000
		3/3	112	10		6.5	69.5	22	7.6	-	-	-	23,000
		3/7	192	10		6.7	71.2	27	7.6	-	-	-	93,000
		3/10	284	6		5.4	52.3	33	7.6	-	-	-	93,000
		3/17	270	10	8	5.3	56.1	34	7.7	-	-	-	230,000
		3/21	272	12		4.5	49.3	33	7.8	-	-	-	23,000
		3/24	270	11		3.7	40.7	46	7.5	-	-	-	150,000
		3/28	229	7		4.9	48.4	29	7.6	215	215	.2	43,000
		3/31	246	7		5.4	53.8	53	7.7	-	-	.16	15,000
		4/25	38	17		3.3	40.9	56	7.4	-	-	-	43,000
		4/28	187	17		3.4	42.8	35	7.6	-	-	-	9,300
		5/2	143	18		3.4	42.5	35	7.5	-	-	-	43,000
		5/5	515	12		4.4	49.2	72	7.4	-	-	-	43,000
		5/9	80	16	132	4.2	51.3	45	7.6	192	230	.12	93,000
		5/12	2379	14		-	-	-	-	-	-	-	430,000
		5/16	1266	15		6.2	74	-	-	-	-	-	93,000
		5/19	1323	15		-	-	13	-	-	-	-	15,000

		5/23	502	14		5.4	62.3	16.	-	-	-	-	93,000
		5/26	621	18		3.1	39.2	77.	-	-	-	-	2,100,000
South Platte River -Fulton Ditch Intake	SP 294.2	7/25	201	21		5.1	68.	3.2	7.7	-	-	-	150,000
		8/8	80	21		4.5	60.5	5.5	-	-	-	-	230,000
		8/24	80	20		2.2	29.3	> 28.	-	-	-	-	93,000
		9/1	82	16		3.4	40.9	12.	-	-	-	-	430,000
		9/7	85	18		3.1	40.	-	-	-	-	-	430,000
		12/1	No data	5		6.7	63.2	23.	-	-	-	-	230,000
South Platte River -Fulton Ditch above Headgate		6/20	33	18		7.6	96.4	1.7	7.4	-	-	-	230,000
		6/23	117	17		7.3	90.8	2.	7.6	-	-	-	9,300
		6/29	148	19		6.6	85.8	4.5	7.2	-	-	-	43,000
		7/11	99	18		7.3	92.4	3.6	7.4	-	-	-	43,000
		7/21	190	18		5.3	67.4	7.3	7.6	-	-	-	43,000
		7/25	201	21		5.4	72.3	3.4	7.6	-	-	-	230,000
		8/4	80	21		4.4	58.9	10.	7.7	-	-	-	430,000
		8/8	29	21		5.2	69.6	5.1	-	-	-	-	930,000
		8/24	30	22		2.8	38.2	15.	-	-	-	-	430,000
		9/1	82	16		3.7	45.1	15.	-	-	-	-	430,000
		9/7	85	19		3.1	40.	-	-	-	-	-	230,000
South Platte River -Brantner Ditch Intake	SP 292	6/23	60	17		7.3	90.3	2.6	7.6	-	-	-	23,000
		6/29	61	20		7.	91.8	5.4	6.9	-	-	-	7,500
		7/11	58	18		7.1	90.	7.1	7.8	-	-	-	43,000
		7/21	57	18		5.6	71.	7.8	7.6	-	-	-	93,000
		7/25	58	21		5.7	77	7.2	7.4	-	-	-	930,000
		8/4	43	22		4.7	30.1	8.8	-	-	-	-	430,000
		8/8	48	22		5.1	69.5	4.9	-	-	-	-	390,000
		8/24	36	22		3.3	45.4	21.	-	-	-	-	230,000
		9/1	36	18		4.	50.4	22.	-	-	-	-	930,000
		9/7	36	18		3.2	40	-	-	-	-	-	930,000
South Platte River -Bridge at Henderson, Colorado	SP 286.7	10/24	44	9		7.5	78	6.9	8.4	-	-	-	4,300
		10/27	35	10		7.4	79	7.8	7.8	-	-	-	93,000
		10/31	29	8		7.5	76.5	10.	-	-	-	-	43,000
		11/3	No	10		7.9	84.4	12.	-	-	-	-	930,000
		11/7		9		7.4	76.7	6.3	-	-	-	-	93,000
		11/10	data	9		7.1	74	11.	-	-	-	-	93,000
		11/14		10		5.1	54.3	23.	7.7	-	-	-	23,000
		11/17	No	10		5.5	58.4	31.	7.8	-	-	-	43,000
		11/21		9		5.5	57.3	34.	7.6	-	-	-	43,000
		11/28	data	14		6.1	71	12	7.9	-	-	-	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity, ppm.	(11) Hardness ppm.	(12) Copper ppm.	(13) Coliforms M.P.N. per 100 ml.
South Platte River -Bridge at Brighton, Colo.	SP 284	3/16	245	8		2.5	26.	58.	7.4	-	-	-	93,000
		4/13	65	11		6.1	66.2	18.	-	236	322	0.12	230,000
		4/27	240	14		1.6	18.4	>65.	7.7	-	-	-	150,000
		5/11	182	16		3.7	44.7	41.	7.4	-	-	-	93,000
		5/25	267	18		3.3	41.5	-	7.5	-	-	-	39,000
South Platte River -bridge at Wattenberg, Colo.	SP 277.	11/28	No data	14		5.6	66	20.	7.9	-	-	-	230,000
		12/1		6		6.2	60	31.	-	-	-	-	930,000
South Platte River - Ft. Lupton gage	SP 272.2	1948											
		12/16	115	0		9.6	78	4.9	7.9	-	-	-	43,000
		12/23	110	0		10.2	84	7.6	8.	-	-	-	43,000
		12/29	100	0		9.9	80	4.9	7.9	-	-	-	4,300
		12/31	98	0		9.9	82	6.4	7.9	-	-	-	7,500
		1949											
		1/13	136	0		9.4	77	4.4	7.9	-	-	.04	2,300
		1/18	134	0		9.9	82	2.3	7.9	280	218	.03	24,000
		1/20	127	0		9.9	82	2.	7.8	-	-	.04	9,300
		1/25	130	0		Broke	-	2.	7.7	292	186	-	2,300
		1/27	142	0		9.2	76	3.4	7.7	-	-	.04	15,000
		1/31	135	0		9.7	80	1.9	7.7	-	-	.04	9,300
		2/1	145	0		9.3	75	1.9	7.7	314	212	.03	24,000
		2/4	160	0		9.1	74	4.	7.7	-	-	.03	4,300
		2/8	200	0	25	9.2	75	7.3	7.7	253	200	.03	9,300
		2/10	210	0		7.5	61	>7.4	7.7	-	-	.05	460,000
		2/14	195	0	25	8.9	72	5.7	7.7	248	182	.05	9,300
		2/16	213	0		6.	49	>29.	7.7	-	-	.12	4,600,000
		2/18	173	4	105	7.8	71	24.	7.8	-	-	.10	430,000
		2/23	155	3	110	8.6	76	14.	7.9	260	-	.03	430,000
		2/25	152	4	130	8.9	81	16.	7.9	-	-	.05	23,000
		3/2	216	6	100	7.3	68.3	25.	7.8	250	-	.07	23,000
		3/4	213	6	170	7.4	69.3	26	7.8	-	-	.07	23,000

		3/8	294	8	260	2.8	28	52	7.7	241	-	0.09	93,000
		3/11	267	5	190	5.2	49	40	7.7	-	-	.12	93,000
		3/16	281	6	140	4.5	43	35	7.8	234	331	.05	93,000
		3/18	272	9	130	4.9	50	39	7.8	-	-	.07	23,000
		3/22	281	8	110	4.4	45	69	7.8	229	303	-	93,000
		3/24	276	6	150	4.9	47	63	7.8	-	-	.07	43,000
		3/28	245	6	75	6.9	65	22	7.9	219	270	.02	23,000
		4/15	164	10	290	7.2	75	12	8.	225	344	.02	9,300
		4/19	98	16	95	7.4	87	4.8	8.1	248	378	.03	4,300
		4/21	61	16	40	7.5	89	4.4	8.	-	-	.02	46,000
		4/25	37	16	25	10.	121	4.8	8.2	-	-	.03	15,000
		4/27	140	14	90	10.7	122	6.6	7.7	207	370	.01	9,300
		4/29	179	18	150	4.8	59	22.	7.8	-	-	.01	1,100,000
		5/5	134	11	100	5.7	61	22.	7.9	188	281	.02	460,000
		5/9	128	14	110	6.2	72	12.	7.8	198	298	.01	23,000
		5/11	161	17	130	5.4	66	20.	7.9	-	-	.01	93,000
		5/13	1580	13	2700	5.	56	37.	7.6	-	-	-	93,000
		5/17	1820	15	1500	5.5	64	30.	7.7	98	179	-	460,000
		5/19	1330	15	500	5.8	68	21.	7.6	-	-	-	240,000
		5/23	528	16	450	5.5	66	15.	7.7	157	213	.01	23,000
		5/26	388	20	280	4.5	57	21.	7.6	-	-	.01	460,000
		5/31	843	16	160	5.6	68	13.	7.6	-	-	.03	15,000
		6/7	5450	15.	2300	5.9	68	9.9	7.4	80	96	-	1,100,000
		6/9	4180	16	750	6.5	77	5.2	7.3	-	-	-	43,000
		6/13	5660	17	480	6.1	74	4.3	7.4	69	94	-	240,000
		6/15	5630	16	720	5.7	69	3.3	7.5	-	-	-	150,000
		6/17	5590	20	360	6.4	82	2.5	7.5	-	-	-	230,000
		6/21	5070	20	240	6.4	84	2.5	7.7	78	97	-	43,000
		6/23	4440	19	240	6.5	83	2.9	7.6	-	-	-	460,000
		6/28	2180	20	160	7.	90	3.4	7.6	94	140	.03	15,000
		6/30	1130	20	120	6.8	89	3.1	7.7	-	-	.02	43,000
		7/5	1320	22	140	6.4	87	3.3	7.6	92	166	.02	43,000
		7/8	2200	21	220	6.2	82	3.8	7.6	-	-	.03	240,000
		7/12	2470	22	220	6.2	82	3.6	7.7	110	187	.02	93,000
		7/14	1900	22	290	5.9	79	3.7	7.8	-	-	.03	93,000
		7/19	734	22	170	5.5	74	6.	7.8	120	187	.02	230,000
		7/21	592	20	170	5.7	74	5.7	7.8	-	-	.05	230,000
		7/25	415	22	110	5.4	72	7.	7.8	140	221	-	-

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(3) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Tur-bid-ity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alka-lin-ity, ppm.	(11) Hard-ness ppm.	(12) Cop-per ppm.	(13) Coliforms M.P.N. per 100 ml.
South Platte River - Ft. Lupton gage (Cont.)	SP 272.2 (Cont.)	7/27	635	22	100	6.1	81	6.2	7.9	-	-	-	-
		7/29	498	21	100	6.	79	4.9	7.8	-	-	-	-
		8/2	234	22	65	5.	67	6.1	7.8	171	221	0.02	4,600,000
		8/4	421	22	110	5.4	72	9.3	7.8	-	-	.03	430,000
		8/8	371	22	85	5.7	76	7.4	8.	136	221	.01	150,000
		8/10	505	22	110	4.9	66	9.3	7.8	-	-	.02	930,000
		8/12	331	22	120	5.1	68	8.5	7.7	-	-	.02	1,500,000
		8/16	339	22	75	5.	67	10.	7.7	160	255	.04	430,000
		8/18	322	20	100	5.1	66	9.9	7.9	-	-	.01	930,000
		8/22	273	21	75	5.6	74	8.8	7.9	170	187	.01	93,000
		8/24	231	22	80	4.8	64	12.	7.9	-	-	.01	930,000
		8/26	247	21	70	4.8	64	12.	7.8	-	-	.02	430,000
		8/30	228	20	45	4.9	64	12.	7.8	179	306	.01	930,000
		9/6	299	17	60	5.4	66	11.	8.1	164	272	.01	230,000
		9/8	257	20	55	4.8	61	13	7.8	-	-	.01	750,000
		9/13	196	15	60	5.8	68	9.3	7.9	196	323	.06	230,000
		9/15	196	17	55	5.8	71	10.	8.	-	-	.02	93,000
		9/19	155	16	60	6.5	78	7.9	7.8	200	289	.01	230,000
		9/21	140	16	35	5.8	70	9.7	7.9	-	-	.03	240,000
		9/23	142	16	55	5.7	68	15.	7.9	-	-	.02	230,000
		9/27	102	16	40	6.3	74	8.5	7.8	-	-	.01	43,000
		10/24	144	10		6.7	72	9.1	8.4	-	-	-	93,000
		10/27	134	11		6.8	74	5.8	7.8	-	-	-	93,000
		10/31	136	10		7.3	78	9.8	-	-	-	-	43,000
		11/3	No	10		7.2	77	13.	-	-	-	-	930,000
		11/7	data	10		7.1	74	14.	-	-	-	-	230,000
		11/10		10		6.6	71	12.	-	-	-	-	430,000
		11/14	for	10		5.4	57	>28.	7.3	-	-	-	43,000
		11/17	this	10		10.4	111	>14.	7.6	-	-	-	230,000
		11/21		11		5.2	57	26.	7.6	-	-	-	75,000
		11/28		13		6.9	79	13.	7.8	-	-	-	2,400,000
		12/1	period	6		6.2	60	24.	-	-	-	-	430,000

South Platte River -Twin Bridge above Thompson River on Route 60	SP 247.8	1948											
		10/16	292	6		7.1	67	29.	-	-	-	-	150,000
		10/26	197	12		4.6	51	63	7.9	-	-	-	93,000
		10/29	200	10		3.9	41	32	8.1	-	-	-	460,000
		11/10	319	5		6.3	58	62	8.1	-	-	-	230,000
		11/18	299	9		7.5	77	64	8.1	-	-	-	230,000
		11/24	314	4		6.7	61	89	8.	-	-	-	430,000
		12/2	280	0		8.2	67	24	8.1	-	-	-	240,000
		12/9	270	0		10.	81	13.	8.1	-	-	-	21,000
		12/13	276	4		10.2	91	4.9	8.1	-	-	-	43,000
		12/16	272	0		10.6	87	6.1	8.1	-	-	-	12,000
		12/23	282	0		10.7	88	5.8	8.1	-	-	-	23,000
		12/29	262	0		10.3	84	4.2	8.1	-	-	-	23,000
		12/31	260	0		10.1	83	4.6	7.9	-	-	-	2,300
		1949											
		1/12	305	0		8.7	71	1.7	8.3	-	-	0.04	24,000
		1/13	303	0		8.5	69	1.9	7.8	-	-	.03	24,000
		1/18	299	0		8.5	69	2.4	7.9	287	149	.03	7,500
		1/20	290	0		8.1	66	2.4	7.8	-	-	.04	75,000
		1/25	292	0		7.8	63	2.5	7.8	280	146	.04	9,300
		1/26	298	0		8.8	71	2.4	7.8	-	-	.05	24,000
		1/28	294	0		9.6	78	2.4	8.	-	-	.04	39,000
		2/1	307	0		8.3	67	2.6	7.7	276	233	.02	15,000
		2/3	311	0		8.3	68	2.2	7.7	-	-	.02	23,000
		2/7	366	2.	20	8.5	72	2.8	7.7	263	146	.03	93,000
		2/9	393	1.		8.5	71	4.6	7.7	-	-	.06	910
		2/11	423	2.		8.3	72	6.9	7.8	-	-	.03	46,000
		2/15	428	1	30	8.9	74	4.7	7.7	252	146	.04	150,000
		2/17	451	2		9	78	9.2	7.8	-	-	.05	75,000
		2/21	393	4	120	9.7	88	7.1	8.	242	-	.02	430,000
		2/24	370	3	160	10.3	91	13	8.	-	-	.01	93,000
		3/1	419	5	150	9.5	88	8.2	8.	252	-	.05	9,100
		3/3	422	6	150	9.1	88.	12.	8.1	-	-	.05	23,000
		3/7	420	8	140	7.8	78.	21.	7.7	227	-	.04	93,000
		3/9	479	5	180	8.8	81	21	7.9	-	-	.05	240,000
		3/11	470	6	170	8.7	82	25	7.8	-	-	.06	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity ppm.	(11) Hardness ppm.	(12) Copper ppm.	(13) Coliforms M.P.N. per 100 ml.
South Platte River -Twin Bridge above Thompson River on Route 60 (Cont'd)	SP 247.8 (Cont.)	3/16	470	6	100	8.5	80	12.	7.8	240	411	0.04	23,000
		3/18	440	10	120	7.8	80	13.	7.9	-	-	.06	23,000
		3/22	425	9	80	8.	82	11	8	232	396	.05	15,000
		3/24	430	7	120	7.8	76	23.	7.9	-	-	.04	93,000
		3/28	388	6	70	8.4	80	14	7.9	225	343	.01	23,000
		3/31	517	5	55	10.3	96	5.2	8.2	-	-	.05	15,000
		4/5	308	11	80	8.3	89	6.2	8.1	249	465	.02	2,100
		4/7	287	12	90	8.4	93	5.5	8.1	-	-	-	6,400
		4/11	359	10	70	10.1	107	6.9	8.1	225	393	.02	2,300
		4/13	328	13	65	10.2	114	7.1	8.3	-	-	.03	15,000
		4/15	366	11	80	10.8	116	6.2	8.2	-	-	.02	9,300
		4/19	280	16	30	10.8	129	4.	8.4	228	446	.06	430
		4/21	219	14	60	11.2	130	6.2	8.4	-	-	.03	1,500
		4/25	196	16	35	9.8	117	3.9	8.3	-	-	.03	930
		4/27	326	14	90	10.7	122	6.6	7.7	207	370	.01	9,300
		4/29	300	20	85	7.5	96	8.4	8.	-	-	.02	110,000
		5/5	85	10	15	8.1	85	2	8.1	236	485	.01	2,300
		5/9	90	15	120	7.4	86	9.5	7.9	184	400	.01	150,000
		5/11	80	18	150	7.4	92	6.8	8.	-	-	.01	23,000
		5/13	40	14	2600	4.4	49	49.	7.6	-	-	-	210,000
		5/17	0	16	1500	6.5	77	24.	7.7	118	213	-	43,000
		5/19	0	16	500	7.	85	16.	7.9	-	-	-	93,000
		5/23	40	18	200	6.9	85	9.1	7.9	160	264	.01	43,000
		5/26	80	20	55	6.7	86	1.8	8.	-	-	.02	2,800
		5/31	105	16	150	7.5	90	6.3	7.8	-	-	.03	75,000
South Platte River -Union Canal Inlet	SP 247.7	6/7	No data for this period	14	1200	6.7	77	5.7	7.4	86	151	-	75,000
		6/9		17	450	6.4	78	2.6	7.4	-	-	-	23,000
		6/13		18	280	6.5	81	2.4	7.5	77	117	-	23,000
		6/15		17	1200	6.	74	2.9	7.4	-	-	-	240,000
		6/17		22	280	6.1	81	1.9	7.5	-	-	-	43,000
		6/21		21	200	6.5	85	1.8	7.8	83	107	-	21,000

		6/23	No data	20	180	6.8	89	1.5	7.6	-	-	-	23,000
		6/28		20	180	7.6	98	2.1	7.7	103	157	0.02	23,000
		6/30		22	170	6.7	89	1.9	7.7	-	-	.01	64,000
		7/5	120	23	220	6.6	88	2.7	7.8	114	200	.01	43,000
		7/8	105	22	320	6.6	87	3.3	7.7	-	-	.01	43,000
		7/12	90	22	320	6.6	86	3.4	7.7	116	187	.03	>1,100,000
		7/14	105	22	350	6.6	86	3.6	7.9	-	-	.06	150,000
		7/19	115	22	170	6.8	90	1.8	8	156	306	.02	150,000
		7/21	105	20	150	7.1	91	1.7	8.1	-	-	.01	93,000
		7/25	120	22	70	6.8	89	1.4	8.2	201	476	-	-
		7/27	130	22	120	7	92	2.7	8.1	-	-	-	-
		7/29	110	22	110	7.2	94	1.9	8.2	-	-	-	-
		8/2	105	22	95	7.5	102	2.1	8.3	183	544	.01	43,000
		8/4	105	23	95	7.5	102	2	8.3	-	-	.01	43,000
		8/8	135	23	55	8.1	110	2	8.3	208	663	.01	29,000
		8/10	135	24	50	8.1	112	1.9	8.4	-	-	0	23,000
		8/12	135	22	40	8.	108	1.5	8.3	-	-	.02	9,300
		8/16	125	22	30	8.3	111	1.4	8.3	232	578	.03	23,000
		8/18	125	21	35	8.6	114	1.7	8.3	-	-	.01	6,400
		8/22	120	21	55	8.3	109	2.2	8.3	232	459	.01	23,000
		8/24	120	21	45	7.8	103	1.9	8.4	-	-	.01	9,300
		8/26	120	22	55	8.3	110	2.	8.3	-	-	.01	4,300
		8/30	100	20	60	8.5	108	1.9	8.3	233	595	.04	75,000
		9/6	85	16	130	7.8	93	2	8.1	221	442	.02	43,000
		9/8	65	18	45	8.1	101	1.5	8.2	-	-	0	43,000
		9/13	70	14	25	9.1	104	1.2	8.3	246	527	.02	23,000
		9/15	65	16	25	9	107	1.4	8.3	-	-	.02	4,300
		9/19	70	16	25	9.3	110	1.2	8.2	240	544	.01	2,300
		9/21	80	16	20	9.6	113	1.2	8.3	-	-	0	15,000
		9/23	85	16	20	9.8	115	1.3	8.3	-	-	.01	2,300
		9/27	85	14	20	9.9	114	1.2	8.3	-	-	.03	4,300
South Platte River -above Cache La Poudre River on County Road	SP 234.5	1948											
		10/16	216	-		9.3	-	-	-	-	-	-	2,800
		10/19	357	-		3.4	-	27.	-	-	-	-	-
		10/22	296	13		6.5	73	11.	-	-	-	-	150,000
		10/28	297	10		7.1	75	21	8.4	-	-	-	240,000
		10/29	305	-		6.8	-	2.5	8.1	-	-	-	36,000
		11/9	290	4		8	74	48	7.9	-	-	-	23,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -above Cache La Poudre River on County Road (Cont.)	SP 234.5 (Cont.)	11/17	305	-		6.4	-	46	7.9	-	-	-	93,000
		11/23	318	4		7.7	70	71	7.7	-	-	-	93,000
		12/1	392	1		7.4	61	43	8.1	-	-	-	93,000
		12/10	372	0		10	82	16	7.9	-	-	-	43,000
		12/14	387	0		9.5	78	17	8.	-	-	-	23,000
		12/16	373	2		9.5	80	17	8.1	-	-	-	29,000
		12/23	384	0		10.4	85	6.7	8.1	-	-	-	23,000
		12/29	299	0		10.5	87	4.6	8.	-	-	-	9,300
		12/31	297	0		10.6	86	5.5	8.1	-	-	-	4,300
		1949											
		1/13	398	0		10.2	84	3.2	7.9	-	-	0.04	46,000
		1/18	393	0		11.	89	2.6	8.1	291	124	.04	9,300
		1/20	380	0		11.5	94	2.2	8.	-	-	.04	7,500
		1/25	381	0		11.2	91	1.6	7.9	286	127	.04	930
		1/27	390	0		10.9	88	2.6	7.8	-	-	.04	7,500
		1/31	383	0		11.2	91	1.9	8.	-	-	.03	24,000
		2/2	404	0		11.1	90	1.5	7.9	287	164	.02	2,300
		2/4	416	0		11.1	90	3.8	7.9	-	-	.06	9,300
		2/8	330	0	30	11.1	91	3.8	7.9	274	130	.03	930
		2/10	359	1		11.	92	6.2	7.8	-	-	.03	4,300
		2/14	411	0	40	10.8	89	3.2	7.8	259	146	.03	9,300
		2/16	446	2		10.8	93	5.8	7.8	-	-	.03	9,300
		2/18	491	3	170	10.3	91	14	8.	-	-	.07	240,000
		2/23	560	4	110	10.3	93	6.6	7.9	258	-	.03	43,000
		2/25	540	5	170	10.3	95	11.	8.	-	-	.06	9,300
		3/2	521	7	90	9.6	94	16.	8.1	265	-	.07	9,300
		3/4	523	7	120	9.4	92	12.	8.1	-	-	.04	9,300
		3/8	575	6	80	8.9	84	9.	7.9	262	-	.05	93,000
		3/10	579	5	170	9.4	87	14	7.9	-	-	.03	240,000
		3/14	584	6	80	9.2	88	8.8	8.	242	479	.04	23,000
		3/17	566	6	90	9.3	89	8.9	8.	-	-	.04	15,000

		3/21	565	9	100	9.3	95	6.5	8.	240	478	.04	23,000
		3/23	501	10	85	8.3	88	11.	8.	-	-	.07	9,300
		3/25	520	6		9.	86	16.	7.9	-	-	.04	4,300
		3/29	572	5	60	10.	92	9.1	8.	224	494	.04	3,900
		4/4	430	6	110	10.4	98	9.2	8	237	483	.03	24,000
		4/6	391	11	45	7.	75	6.2	8.1	-	-	-	9,300
		4/8	385	10	45	8.8	92	3.4	8.2	-	-	.03	15,000
		4/12	433	12	45	9.5	104	4.7	8.2	240	502	.03	9,300
		4/14	417	8	40	9.4	94	4.3	8.2	-	-	.02	4,300
		4/18	379	12	20	9.6	105	3.8	8.2	243	548	.02	930
		4/20	350	14	25	9.8	114	3.	8.3	-	-	.02	2,300
		4/22	338	15	50	9.9	116	3.6	8.3	-	-	.06	2,300
		4/26	296	12	15	9.9	109	2.4	8.3	-	-	.03	4,300
		4/28	379	16	95	8.8	106	7.5	8.2	218	400	.02	46,000
		5/2	304	16	40	9.	108	3.5	8.2	224	434	.01	9,300
		5/6	213	9	25	9.6	98	2.1	8.	-	-	.01	9,300
		5/10	318	17	70	7.9	96	4.4	8.	210	570	.02	9,300
		5/12	306	16	80	7.9	94	3.6	8.	-	-	.02	15,000
		5/16	1220	16	1600	6.8	81	15.	7.6	129	230	-	750,000
		5/18	1463	15	1100	7.2	84	20.	7.7	-	-	-	93,000
		5/20	1359	17	400	6.9	84	10.	7.8	-	-	-	23,000
		5/24	518	18	170	7.4	93	3.7	7.9	186	366	0	9,300
		5/27	257	19	20	7.	89	3.6	7.9	-	-	.03	< 360
		6/6	10250	16	1600	6.2	74	7.	7.6	80	185	-	93,000
		6/8	12950	17	1500	7.	85.	4.4	7.4	-	-	-	150,000
		6/10	8700	19	480	6.9	87	2.	7.5	-	-	-	93,000
		6/14	13700	19	560	6.9	87	2.4	7.6	92	165	-	21,000
		6/16	11000	20	520	6.8	88	1.9	7.6	-	-	-	93,000
		6/20	10500	21	270	6.9	91	1.6	7.7	79	142	-	21,000
		6/22	8850	21	220	6.6	88	1.5	7.7	-	-	-	9,300
		6/24	7250	20	240	7.1	92	1.4	7.7	-	-	-	43,000
		6/29	3020	22	190	6.8	91	2.3	7.7	111	208	.01	93,000
		7/1	1235	22	180	6.7	91	1.5	7.9	-	-	.02	240,000
		7/7	1100	22	300	6.7	90	2.3	7.8	128	272	.02	240,000
		7/11	2750	22	310	6.7	90	2.1	7.9	122	221	.02	9,100
		7/13	2575	24	240	6.7	93	2.2	7.8	-	-	.01	240,000
		7/15	2210	22	270	7.	93	2.	8.	-	-	.03	93,000
		7/20	625	24	140	6.7	93	1.5	8.	186	408	.01	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -above Cache La Poudre River on County Road (Cont.)	SP 234.5 (Cont.)	7/22	441	22	120	6.8	93	1.1	8.	-	-	0.02	23,000
		7/26	148	22	15	7.5	101	.6	8.1	234	544	-	-
		7/28	180	22	35	8.	107	2.1	8.1	-	-	-	-
		8/1	164	22	20	8.7	117	1.6	8.1	-	-	.03	3,900
		8/3	133	22	5	9.3	123	1.8	8.2	234	595	-	2,300
		8/5	119	22	20	9.4	127	1.3	8.2	-	-	.02	4,300
		8/9	102	20	15	9.6	125	1.6	8.2	243	646	.01	24,000
		8/11	116	23	20	9.9	136	1.6	8.2	-	-	.01	2,300
		8/15	101	23	25	10.	137	1.4	8.2	248	663	.04	24,000
		8/17	103	23	25	9.9	135	1.5	8.2	-	-	.01	4,300
		8/19	108	22	30	10.	133	1.7	8.2	-	-	.01	9,300
		8/23	104	22	5	10.3	139	1.4	8.2	266	629	.01	2,300
		8/25	105	22	25	10.8	144	1.4	8.3	-	-	.02	930
		8/29	125	18	25	10	126	1.3	8.1	258	663	.01	2,300
		9/2	196	20	30	9.7	125	1.6	8.2	-	-	.01	4,300
		9/7	322	18	75	8.2	103	1.5	8.2	252	680	.01	9,300
		9/12	248	14	35	9.	104	1.	8.2	255	680	.01	7,500
		9/14	234	16	25	9.6	116	.8	8.3	-	-	.03	2,300
		9/16	141	18	20	9.4	117	1.4	8.2	-	-	.01	2,300
		9/20	92	18	<5	10.3	126	1.1	8.2	261	663	.01	1,500
		9/22	79	17	<5	10.8	131	1.9	8.2	-	-	.01	430
		9/26	95	16	<5	10.5	124	1.2	8.1	-	-	.01	1,500
South Platte River -River-side Canal Inlet	SP 227.5	3/10	528	4	40	10.5	95	9.8	8.	-	-	.03	21,000
		3/14	524	6	25	10.4	100	2.6	8.1	248	549	.03	7,500
		3/17	407	6	20	8.8	85	5.6	7.9	-	-	.03	9,300
		3/21	166	8	15	7.8	77	2.7	7.9	269	565	.06	1,500
		3/23	107	10	20	9.7	103	2.6	8.	-	-	.02	24,000
		3/25	507	6		10.3	99	3.8	8.	-	-	.02	15,000
		3/29	536	5	20	10.1	94	2.8	7.9	242	483	.06	9,300
		4/4	209	6	40	9.8	92	4.4	8.1	248	525	.02	46,000
		4/6	106	10	40	10.	103	3.4	8.	-	-	-	4,300

		4/8	147	8	20	6.1	61	3.	7.9	-	-	0.03	3,900
		4/12	178	10	20	8.3	86	3.6	8.	268	556	.03	430
		4/14	178	6	30	7.7	74	3.	7.9	-	-	.02	4,300
		4/18	183	10	15	7.6	80	3.6	7.9	264	574	.06	4,300
		4/20	135	13	25	7	78	3.3	7.9	-	-	.03	2,300
		4/22	131	13	30	7.5	83	5.1	8	-	-	.02	2,100
		4/26	0	9	20	3.	31	2.2	7.7	-	-	.04	230
		4/28	0	9	15	5.8	59	3.7	7.8	271	519	.03	9,300
		5/2	369	14	20	4.	47	2.3	7.7	290	502	.02	< 360
		5/6	273	8	40	2.8	28	2.3	7.7	-	-	.03	1,500
		5/10	373	14	20	4.9	57	3.1	7.7	260	570	.02	4,300
		5/12	354	14	30	1.7	19	2.3	7.1	-	-	.02	2,300
		5/16	528	16	750	6.9	83	11.	7.7	145	315	-	150,000
		5/18	678	15	1200	6.8	79	16.	7.7	-	-	-	460,000
		5/20	690	18	450	7.	87	9.7	7.8	-	-	-	75,000
		5/24	370	18	110	7.6	96	3.1	8	202	519	.02	240,000
		5/27	297	17	20	1.9	23	8.1	7.7	-	-	.01	2,300
		6/6	No	16	1700	5.2	63	9.6	7.6	87	193		93,000
		6/8		17	1400	6.7	82	4.6	7.4	-	-	-	240,000
		6/10	data	18	480	7.1	89	2.2	7.5	-	-	-	39,000
		6/14		18	400	6.9	86	2.5	7.6	87	162		240,000
		6/16	for	20	420	6.7	87	3.2	7.6	-	-	-	23,000
		6/20		22	230	7.	94	1.9	7.7	82	142	-	23,000
		6/22	this	23	170	6.7	91	1.8	7.7	-	-	-	93,000
		6/24		20	180	6.9	89	1.7	7.7	-	-	-	9,300
		6/29	period	22	200	6.7	90	3.	7.7	124	231	.01	43,000
		7/1	1335	23	170	6.5	89	1.6	7.9	-	-	.02	23,000
		7/7	1375	22	400	6.5	86	2.9	7.8	138	323	.03	460,000
		7/11	2855	22	360	6.7	89	2.4	7.9	131	289	.02	23,000
		7/13	2860	23	270	6.8	93	2.8	7.9	-	-	.01	240,000
		7/15	2300	22	270	6.9	92	2.4	8.	-	-	.03	240,000
		7/20	662	24	150	6.7	94	1.5	8.1	199	510	.02	93,000
		7/22	478	22	140	7.1	94	1.3	8.2	-	-	.01	93,000
		7/26	168	22	30	7.7	102	1.	8.2	246	612	-	-
		7/28	199	22	40	8.3	110	1.8	8.1	-	-	-	-
		8/1	185	22	20	8.7	117	1.4	8.2	-	-	.02	23,000
		8/3	158	22	10	8.5	113	1.3	8.3	252	697	.02	4,300
		8/5	145	23	25	9.1	124	1.3	8.3	-	-	.03	4,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -Riverside Canal Inlet (Cont.)	SP 227.5 (Cont.)	8/9	145	22	25	9.5	127	2.1	8.3	260	782	0.01	>110,000
		8/11	151	23	25	9.8	133	2.	8.2	-	-	.01	15,000
		8/15	135	22	15	9.5	127	1.6	8.2	260	731	.03	29,000
		8/17	142	22	20	9.9	133	1.6	8.2	-	-	.02	23,000
		8/19	142	21	20	9.8	129	1.4	8.3	-	-	.04	15,000
		8/23	132	22	20	9.9	134	1.3	8.3	274	697	.02	110,000
		8/25	139	22	15	10.5	140	1.4	8.3	-	-	.01	23,000
		8/29	158	19	10	10.2	129	1.2	8.3	266	748	.01	7,500
		9/2	244	20	30	9.3	120	1.9	8.2	-	-	.01	43,000
		9/7	379	18	100	8.	99	1.5	8.3	259	680	.01	23,000
		9/12	295	14	30	8.3	94	1.0	8.1	266	714	.02	9,300
		9/14	280	16	25	8.9	108	1.	8.3	-	-	.02	43,000
		9/16	181	18	40	8.5	106	1.2	8.2	-	-	.02	7,500
		9/20	139	18	15	9.3	115	.9	8.2	268	731	.01	910
		9/22	135	16	10	9.8	117	.8	8.2	-	-	.02	9,300
		9/26	135	15	10	9.8	115	.9	8.1	-	-	.02	2,300
South Platte River - bridge on county road 4 miles east of Kersey, Colo.	SP 226.9	1948											
		10/19	533	-		6.5	-	7.9	-	-	-	-	-
		10/22	421	12		5.3	58	Depl.					>1,100,000
		10/26	352	12		6.4	70	11.	7.8	-	-	-	Indeterm.
		10/28	369	10		5.2	55	31.	7.7	-	-	-	2,400,000
		11/9	403	3		6.1	54	40.	8.1	-	-	-	430,000
		11/17	421	8		4.8	49	36.	7.7	-	-	-	210,000
		11/23	433	0		5.3	49	64.	7.6	-	-	-	210,000
		12/1	530	2		7.4	63	40	8.1	-	-	-	150,000
		12/10	460	0		9.4	76	3.2	8.1	-	-	-	75,000
		12/14	473	0		9.8	81	8.2	8.1	-	-	-	43,000
		12/16	460	2		9.9	83	11.	8.1	-	-	-	75,000
		12/23	452	0		10.	82	6.6	8.	-	-	-	43,000
		12/29	391	0		9.9	80	3.6	7.9	-	-	-	150,000
		12/31	391	0		10.6	86	5.5	8.1	-	-	-	4,300

		1949											
		1/13	290	0		9.6	78	5.2	7.9	-	-	0.05	75,000
		1/18	300	0		10.3	83	3.3	8.	299	116	.04	43,000
		1/20	250	0		10.	81	2.5	7.9	-	-	.05	93,000
		1/25	275	0		9.9	80	3.2	7.8	300	116	.05	150,000
		1/27	275	0		9.8	79	3.4	7.7	-	-	.04	64,000
		1/31	285	0		9.6	78	2.4	7.8	-	-	.03	93,000
		2/2	300	0		9.1	74	2.5	7.7	295	146	.02	43,000
		2/4	300	0		9.1	74	4.6	7.7	-	-	.07	460,000
		2/8	300	0	15	9.4	76	2.8	7.8	298	130	.03	75,000
		2/10	300	0		10.	81	3.9	7.8	-	-	.03	43,000
		2/14	300	0	15	9.5	77	4.7	7.8	272	127	.05	23,000
		2/16	300	2		10.2	87	4.4	7.9	-	-	.03	43,000
		2/18	300	2	120	10.2	89	9.7	7.9	-	-	.04	430,000
		2/23	200	4	100	9.2	83	6.6	7.9	267	-	.02	93,000
		2/25	200	5	160	9.3	86	9.9	8.1	-	-	.05	21,000
		3/2	610	7	95	9.1	89	7.8	8.	274	-	.05	23,000
		3/4	637	8	140	9.3	92	9.8	8.1	-	-	.03	23,000
		3/8	597	6	110	8.4	80	10.	7.9	269	-	.04	43,000
		3/10	677	4	120	9.	82	12.	8.	-	-	-	93,000
		3/14	637	6	90	9.	84	9.	8.	260	539	.03	93,000
		3/17	610	6	100	9.1	88	7.1	8.	-	-	.04	23,000
		3/21	581	9	75	9.	92	7.2	8.	244	542	.04	23,000
		3/23	575	10	70	8.4	89	6.3	8.1	-	-	.03	24,000
		3/25	616	6		8.7	82	12.	8.	-	-	.03	110,000
		3/29	597	5	50	9.4	87	8.8	8.	233	483	.04	24,000
		4/4	597	5	110	8.1	75	11.	7.9	240	518	.03	24,000
		4/6	505	12	45	8.7	94	6.2	8.2	-	-	-	24,000
		4/8	467	10	30	8.3	87	5.1	8.1	-	-	.03	46,000
		4/12	511	12	30	9.3	101	4.2	8.1	244	542	.03	43,000
		4/14	511	7	35	10.1	98	4.2	8.1	-	-	.02	23,000
		4/18	457	12	15	9.3	101	3.8	8.2	244	565	.02	15,000
		4/20	453	15	25	9.7	113	2.1	8.2	-	-	.03	23,000
		4/22	427	16	30	10.	118	2.9	8.3	-	-	.02	43,000
		4/26	381	12	40	9.4	103	2.6	8.2	-	-	.01	75,000
		4/28	457	16	20	10.2	122	4.4	8.3	235	502	.01	460,000
		5/2	369	16	35	9.4	114	2.4	8.2	229	451	.01	43,000
		5/6	273	9	40	9.3	96	4.2	8.	-	-	-	43,000
		5/10	373	15	60	7.7	93	3.8	8.1	223	604	.02	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -bridge on county road 4 miles east of Kersey, Colorado. (Cont.)	SP 226.9 (Cont.)	5/12	354	16	75	7.7	90	2.7	8.1	-	-	0.01	15,000
		5/16	542	16	750	6.3	75	10.	7.7	144	315	-	240,000
		5/18	687	15	1200	6.4	75	18.	7.7	-	-	-	43,000
		5/20	392	18	450	4.5	56	9.4	7.8	-	-	-	23,000
		5/24	216	17	140	7.1	87	4.3	8.	203	468	.02	43,000
		5/27	297	20	35	7.2	93	1.9	8.1	-	-	.02	43,000
South Platte River - Empire Ditch Inlet	SP 226.8	6/6	No	16	1200	4.8	58	7.7	7.6	97	236	-	430,000
		6/8		17	1300	6.2	76	4.3	7.5	-	-	-	230,000
		6/10	data	18	380	6.8	85	2.2	7.8	-	-	-	93,000
		6/14		18	1200	7.	87	4.5	7.8	130	267	-	460,000
		6/16	for	23	75	11.	149	5.	8.6	-	-	-	910
		6/24		20	230	6.5	85	1.9	7.7	-	-	-	24,000
		6/29	June	22	220	6.8	91	2.	7.8	126	242	.01	110,000
		7/1	1159	24	170	6.8	94	1.7	8.	-	-	-	43,000
South Platte River - Bijou Canal crossing Hwy. 34	SP 217.6	6/6	300	17	1500	5.	61	12.	7.6	102	227	-	930,000
		6/8	0	18	1100	6.3	79	4.5	7.5	-	-	-	93,000
		6/10	0	18	480	6.5	82	2.8	7.5	-	-	-	23,000
		6/14	0	20	240	7.2	94	1.7	7.9	134	240	-	4,300
		6/16	77	22	600	6.5	88	2.9	7.6	-	-	-	24,000
		6/20	154	22	240	6.4	86	2.2	7.7	97	175	-	7,500
		6/22	270	23	190	5.8	80	2.1	7.7	-	-	-	24,000
		6/24	275	21	180	6.5	86	1.9	7.7	-	-	-	24,000
		6/29	240	22	230	6.9	93	1.8	7.8	125	231	.02	24,000
		7/1	260	22	170	6.9	94	1.3	8.	-	-	.01	23,000
		7/7	250	23	350	6.6	91	3.2	7.9	140	323	.02	210,000
		7/11	260	22	370	6.8	91	2.8	7.9	131	272	.02	23,000
		7/13	260	23	370	6.9	91	3.2	7.9	-	-	.01	93,000
		7/15	260	22	340	7.	94	2.5	8.1	-	-	.04	39,000
		7/20	300	24	150	7.	97	1.5	8.1	197	510	.03	23,000
		7/22	147	22	120	7.4	99	1.3	8.2	-	-	.01	4,300
		7/26	56	21	60	7.8	102	1.2	8.3	239	612	-	-

		7/28	56	22	40	8.4	111	1.4	8.3	-	-	-	-
		8/1	56	22	40	8.9	118	1.6	8.3	-	-	.04	910
		8/3	56	21	40	9.5	125	1.8	8.3	244	646	.01	2,300
		8/5	56	22	30	9.3	125	1.3	8.3	-	-	.02	4,300
		8/9	56	21	35	9.6	126	1.7	8.3	255	671	.01	4,300
		8/11	56	23	30	9.1	124	2.1	8.3	-	-	.01	930
		8/15	56	22	30	10.3	138	1.5	8.3	249	714	.02	2,300
		8/17	56	22	25	10.	134	1.5	8.3	-	-	.02	9,300
		8/19	56	21	25	10.	131	1.6	8.3	-	-	.01	930
		8/23	56	22	10	11.6	156	1.7	8.4	262	663	.02	930
		8/25	56	22	20	12.	162	1.4	8.4	-	-	.04	2,300
		8/29	56	20	20	11.6	149	2.1	8.3	252	714	.02	2,300
		9/7	200	18	60	8.5	106	1.4	8.3	255	714	.03	2,300
		9/12	320	15	55	7.6	89	1.6	8.3	260	748	.01	24,000
		9/14	315	16	45	8.8	104	1.	8.3	-	-	.02	4,300
		9/16	255	18	45	8.7	107	1.2	8.3	-	-	.01	4,300
		9/20	196	17	40	10.4	127	2.3	8.3	266	731	.01	2,100
		9/22	196	16	20	11.6	138	1.8	8.3	-	-	.01	4,300
		9/26	96	16	20	11.6	137	1.1	8.3	-	-	.02	2,300
South Platte River-Sublette, Colo. - bridge north of route #144.	SP 210	3/10	81	6	25	11.8	111	1.7	8.	-	-	.03	750
		3/14	77	6	25	10.9	102	2.2	8.	260	578	.04	750
		3/17	76	7	15	11.6	113	2.6	8.	-	-	.03	150
		3/21	76	10	5	11.6	120	1.6	8.1	244	581	.02	430
		3/23	77	10	10	11.2	118	1.	8.1	-	-	.01	430
		3/25	78	6		10.3	96	1.4	8.	-	-	.02	93
		3/29	81	6	8	11.2	105	1.1	8.	243	541	.04	93
		4/6	240	10	65	9.1	94	4.2	8.1	254	478	-	4,600
		4/8	230	10	30	8.7	90	2.8	8.1	-	-	.03	930
		4/12	248	10	20	9.4	97	1.8	8.1	253	570	.03	210
		4/14	248	6	35	9.8	94	1.7	8.1	-	-	.01	430
		4/18	248	10	5	9.3	98	2.4	8.1	247	523	.02	750
		4/20	235	12	30	9.7	107	1.8	8.1	-	-	.02	2,400
		4/22	218	14	35	9.6	111	1.7	8.2	-	-	.02	430
		4/26	146	12	25	9.	98	1.6	8.1	-	-	.01	4,600
		4/28	210	16	35	8.1	97	4.1	8.2	241	502	0	4,300
		5/2	348	16	45	8.8	104	2.8	8.2	236	451	.01	2,300
		5/10	333	16	55	7.9	93	3.1	8.	226	536	.01	24,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity, ppm.	(11) Hardness ppm.	(12) Copper ppm.	(13) Coliforms M.P.N. per 100 ml.
South Platte River -Sublette, Colo. -bridge north of route 144 (Cont.)	SP 210. (Cont.)	5/12	272	16	80	7.8	92.	2.	8.	-	-	.02	110,000
		5/16	620	15	1100	7.1	83	8.4	7.7	144	315	-	23,000
		5/18	735	14	1300	7.4	86	20.	7.8	-	-	-	240,000
		5/20	515	18	450	9.1	113	7.7	7.9	-	-	-	7,500
		5/24	148	16	35	7.9	95	1.4	8.	246	536	.01	930
		5/27	260	20	120	7.5	97	2.7	8.2	-	-	.04	9,300
South Platte River -Ft.Morgan, Colo. about one mile below Hwy. bridge in town.	SP 183.8	5/2	312	16	40	8.6	102	3.4	8.1	241	536	0	39,000
		5/6	306	10	50	9.2	96	2.3	8.1	-	-	.01	240,000
		5/10	312	16	55	8.2	97	3.	8.1	220	570	.02	93,000
		5/12	213	16	30	7.9	93	2.6	8.	-	-	.02	23,000
		5/16	585	15	450	7.9	92	7.9	8	198	451	-	43,000
		5/18	854	14	1300	7.6	87	21.	7.9	-	-	-	93,000
		5/20	615	18	450	7.5	94	7.1	8.1	-	-	-	93,000
		5/24	327	16	55	8.1	96	1.7	8.2	245	553	.04	2,300
		5/27	231	21	30	7.2	95	1.6	8.1	-	-	.04	9,300
		6/6	850	18	850	7.2	89	13.	7.8	162	355	-	93,000
		6/8	14300	18	13000	6.2	77	5.8	7.4	-	-	-	43,000
		6/10	4700	18	1100	6.2	78	2.2	7.6	-	-	-	43,000
		6/14	9900	18	2400	6.1	76	2.4	7.6	108	209	-	93,000
		6/16	14200	20	260	6.1	80	2.6	7.8	-	-	-	23,000
		6/20	12700	21	100	7.2	95	1.9	7.8	145	311	-	7,500
		6/22	11900	23	55	8.1	111	2.	7.9	-	-	-	9,300
		6/29	2200	22	290	7.1	94	1.4	7.9	154	327	.02	24,000
		7/1	910	22	220	7.	94	1.2	8.1	-	-	.01	93,000
		7/7	560	24	800	6.9	95	2.1	8.1	200	476	.02	240,000
		7/11	1100	22	430	7.3	99	2.1	8.1	152	374	.02	240,000
		7/13	1210	23	4500	7.1	97	2.3	7.9	-	-	.02	93,000
		7/15	1130	22	550	7.1	96	1.5	8.1	-	-	.02	93,000
		7/20	315	24	240	7.	98	1.5	8.1	213	510	.01	23,000
		7/22	225	22	80	7.3	98	.9	8.2	-	-	.01	2,300
		7/26	106	20	160	7.3	94	1.8	8.1	237	612	-	-

		7/28	60	22	120	8.1	109	1.8	8.	-	-	-	-
		8/1	45	20	70	7.6	98	2.	8.1	-	-	.02	23,000
		8/5	88	22	100	7.3	97	2.2	8.1	230	612	.02	23,000
		8/9	120	22	95	7.9	107	2.4	8.2	220	629	.01	43,000
		8/11	240	23	130	7.4	101	2.6	8.1	-	-	.01	4,300
		8/15	205	22	110	7.9	105	2.6	8.1	217	612	.03	>110,000
		8/17	170	22	70	8.4	111	2.4	8.1	-	-	.03	93,000
		8/19	210	20	65	9.	118	2.4	8.2	-	-	.01	460,000
		8/23	280	22	90	8.1	109	2.1	8.2	222	527	.03	43,000
		8/25	225	22	75	8.1	110	1.9	8.2	-	-	.01	240,000
		8/29	300	20	75	7.5	96	2.1	8.1	221	629	.03	43,000
		9/7	No data for this period	18	55	7.7	97	2.	8.2	230	612	.01	43,000
		9/12		14	35	8.	92	1.8	8.1	233	608	.01	43,000
		9/14		16	35	8.5	101	2.1	8.2	-	-	.02	43,000
		9/16		18	30	8.5	105	2.	8.2	-	-	.01	240,000
		9/20		18	25	9.3	115	2.3	8.2	220	629	.01	43,000
		9/26		16	25	10.6	125	3.	8.1	-	-	.01	75,000
South Platte River - Lower Platte & Beaver Canal, near intake.	SP 178.4	6/6	85	18	800	6.8	85	13.	7.9	178	390	-	230,000
		6/8	0	18	12500	6.	74	7.2	7.5	-	-	-	23,000
		6/10	0	18	1400	6.	76	3.2	7.5	-	-	-	23,000
		6/14	0	18	2100	6.9	86	2.9	7.6	116	213	-	93,000
		6/16	0	20	880	-	-	3.2	7.6	-	-	-	23,000
		6/20	160	22	310	6.6	88	2.3	7.8	102	185	-	23,000
		6/22	165	23	220	6.2	84	2.1	7.7	-	-	-	24,000
		6/24	163	22	650	6.6	87	2.	7.7	-	-	-	9,300
		6/29	200	22	310	6.9	92	1.8	7.9	152	310	.01	24,000
		7/1	160	23	220	6.8	93	1.6	8.1	-	-	.02	23,000
		7/7	130	24	800	6.9	95	2.2	8.1	204	493	.02	43,000
		7/11	270	22	490	7.2	96	2.6	8.1	156	374	.04	240,000
		7/13	230	22	6000	7.2	98	2.3	7.9	-	-	.02	230,000
		7/15	170	22	550	7.2	96	2.	8.2	-	-	.04	23,000
		7/20	25	24	200	7.	96	1.8	8.1	219	527	.01	9,300
		7/22	38	20	110	7.7	100	1.3	8.2	-	-	.01	23,000
		7/26	38	20	150	7.5	97	1.7	8.1	239	561	-	-
		7/28	38	20	130	7.6	98	1.6	8.1	-	-	-	-
		8/1	38	20	90	8.	104	2.3	8.1	-	-	.04	23,000
		8/5	38	22	95	7.9	106	2.4	8.1	230	612	.02	43,000
		8/9	38	20	100	8.1	105	2.4	8.2	224	646	.01	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness ppm.	Copper ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -Lower Platte & Beaver Canal, near intake (Cont.)	SP 178.4 (Cont.)	8/11	38	22	90	7.6	103	2.7	8.2	-	-	0.01	2,300
		8/15	38	20	140	7.8	100	3.	8.2	218	612	.04	46,000
		8/17	38	20	95	7.7	100	2.2	8.1	-	-	.02	93,000
		8/19	38	20	90	8.2	104	2.1	8.2	-	-	.02	23,000
		8/23	38	22	90	7.7	102	2.6	8.2	226	595	.02	43,000
		8/25	38	22	100	7.8	104	2.7	8.2	-	-	.01	43,000
		8/29	38	20	90	7.9	101	2.3	8.2	219	578	.04	75,000
		9/7	78	18	45	7.7	97	2.	8.3	231	612	.01	43,000
		9/12	58	15	55	8.	94	1.8	8.2	237	608	.02	43,000
		9/14	58	14	45	8.6	99	1.8	8.3	-	-	.02	15,000
		9/16	58	16	40	8.3	100	1.9	8.2	-	-	.01	9,300
		9/20	130	16	35	8.5	101	1.7	8.2	225	646	.01	4,300
		9/22	130	14	35	8.8	101	1.4	8.1	-	-	.01	43,000
		9/26	97	16	25	8.9	105	2.	8.1	-	-	.04	9,300
South Platte River -below Ft. Morgan, Colo. about 1 mile below Hwy. bridge in town.	SP 177.8	3/10	255	2	35	10.7	93	4.4	8.1	-	-	.02	23,000
		3/14	235	6	20	10.3	99	3.	8.1	250	638	.03	4,300
		3/17	263	5	30	10.6	98	2.6	8.1	-	-	.03	4,300
		3/21	235	10	40	9.6	99	2.3	8.1	252	670	.04	9,300
		3/23	196	10	40	9.7	100	1.5	8.2	-	-	.03	2,300
		3/25	282	4		10.5	95	2.	8.1	-	-	.04	9,300
		3/29	316	4	30	10.7	97	1.3	8.2	238	599	.04	9,300
		4/14	385	8	50	9.8	97	2.1	8.2	243	576	.01	9,300
		4/20	402	12	45	9.3	101	2.2	8.2	244	565	.02	930
		4/22	395	16	55	8.9	105	1.6	8.3	-	-	.03	4,300
		4/26	202	14	15	8.4	96	1.2	8.1	-	-	.04	4,300
		4/28	195	16	6	9.2	108	1.1	8.1	262	570	-	24,000
South Platte River -Atwood, Colo. Bridge on route 63.	SP 160.8	5/13	141	12		8.4	88	1.1	8.3	-	-	.02	1,500
		5/18	126	12	25	8.4	89	2.	8.3	185	665	.03	1,500
		5/23	152	20	15	7.6	95	2.3	8.2	260	665	.02	750
		11/30	109	4	3	11.2	99	1.9	8.1	172	718	.01	360
		12/2	102	4		11.4	101	2.	8.2	-	-	.01	230

		12/5	105	8	7	11.3	96	2.	8.1	210	745	.01	430
		12/7	105	4		10.9	98	2.	8.1	-	-	.01	150
		12/8	104	2	2	11.5	97	1.5	8.1	280	718	.02	43
		12/13	106	0	25	11.8	94	3.4	8.	164	662	.01	2,400
		12/15	106	0		12.	95	2.5	8.	-	-	.01	11,000
		12/19	106	2		11.3	102	2.7	8.1	-	-	-	91
		12/20	106	0		- Broken -		1.3	8.2	-	-	-	210
South Platte River - Cole Extension Ditch, bridge on Hwy. 6	SP 155.2	7/11	6.5	24	75	7.2	96	2.5	8.1	206	408	.05	4,600
		7/13	13	26		8.4	115	3.6	8.3	-	-	.04	4,600
		7/20	0	25	9	10.8	146	6.8	8.4	198	332	.03	230
		7/22	10.6	23		11.3	148	3.3	8.4	-	-	.01	1,500
		7/26	4.5	25	30	13.3	179	3.4	8.2	196	323	.02	460
		7/28	5.6	20		12.3	153	2.6	8.3	-	-	.01	2,400
South Platte River - Sterling No. 1 Canal, bridge on U.S. Hwy. 138	SP 155.	9/27	64	14	8	8.6	96	2.1	8.2	184	513	.02	460
		9/29	71	14		9.6	107	5.	8.3	-	-	.02	930
		10/4	88	14	5	10.6	120	2.4	8.3	237	522	.02	930
		10/6	72	14		9.2	104	2.8	8.2	-	-	.01	4,600
		10/10	56	10	40	9.5	97	3.5	8.2	240	513	.02	46,000
		10/12	33	9		9.7	97	2.4	7.8	-	-	.02	9,300
		10/14	33	10	50	9.4	98	4.	8.3	193	532	.01	4,300
		10/17	30	10	35	9.8	102	2.7	8.2	240	551	.01	2,400
		10/18	28	12		9.5	103	1.6	8.2	-	-	.02	9,300
South Platte River - Sterling, Colo. -bridge on Hwy. 6	SP 153.	11/30	134	4	10	9.4	84	7.6	8.2	179	704	.01	240,000
		12/2	127	8		7.8	76	Depl.	8.5	-	-	.1	11,000,000
		12/5	130	6	80	8.1	75	Depl.	8.2	384	732	.09	9,300,000
		12/7	130	8		7.7	75	240.	8.4	-	-	.10	2,300,000
		12/8	129	1	70	11.8	96	33.	8.4	278	718	.01	230,000
		12/13	121	2	150	8.9	74	Depl.	8.5	397	732	.10	11,000,000
		12/15	126	2		10.8	97	65.	7.9	-	-	.06	150,000
		12/19	131	2		11.5	96	23	7.9	-	-	-	300
		12/20	121	0		12.	97	31	7.9	-	-	-	2,300
South Platte River - Ford, Colo. Bridge on State Hwy. east of town.	SP 144.5	5/10	130	12	15	8.6	90	2.8	8.2	253	846	.01	93,000
		5/13	158	13		8.2	88	2.4	8.2	-	-	.03	240,000
		5/18	160	14	10	8.1	89	2.1	8.2	205	646	.02	21,000
		5/23	215	21	15	7.6	96	1.9	8.2	264	656	.01	9,300
		10/4	114	18	3	10.2	125	2.8	8.3	240	513	.01	24,000
		10/6	146	16		9.8	115	4.4	8.4	-	-	.0	9,300
		10/10	145	10	25	8.3	86	Depl.	7.6	231	532	[illegible]	Indeterm.

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -Ford, Colo. Bridge on State Hwy. east of town. (Cont.)	SP 144.5 (Cont.)	10/12	153	12		8.	85	18.	7.9	-	-	0.03	930,000
		10/14	178	12	5	6.8	72	15.	8.1	195	484	.02	930,000
		10/17	190	12	40	5.9	63	29.	8.	264	466	.02	2,400,000
		10/18	192	14		5.1	57	26.	8.	-	-	.01	4,300,000
		11/30	173	4	60	6.6	59	47.	8.	176	718	.01	930,000
		12/2	166	4		4.5	40	46.	8.	-	-	.03	930,000
		12/5	169	3	30	5.3	45	55.	8.	232	690	.03	2,300,000
		12/7	169	4		4.7	41	57.	8.	-	-	.03	1,500,000
		12/8	168	1	120	6.4	52	56.	8.	320	690	.03	240,000
		12/13	143	0	60	8.	64	58	8.	191	718	.04	2,400,000
		12/15	156	1		8.4	68	28	8.	-	-	.01	430,000
		12/19	170	2		9.8	89	6.6	8.	-	-	-	93,000
		12/20	143	0		10.2	81	3.6	8.	-	-	-	93,000
South Platte River - Crook, Colo. Bridge, State Hwy. 25.	SP 124.1	5/10	31	12	55	8.9	94	2.7	8.3	262	846	.02	930
		5/13	35	14		8.5	92	1.5	8.3	-	-	.02	2,300
		5/18	77	15	50	5.5	61	4.	8.3	164	693	.06	9,300
		5/23	253	20	20	7.4	91	2.6	8.3	248	656	.03	6,400
		10/10	235	12		9.1	95	5.8	8.2	227	532	.03	150,000
		10/12	258	10	40	9.1	92	4.	7.9	-	-	.01	93,000
		10/14	283	11	25	9.2	94	3.4	8.2	178	418	.02	460,000
		10/17	225	12	30	9.	94	1.9	8.3	256	418	.01	93,000
		10/18	227	14		8.5	93	4.9	8.2	-	-	.01	390,000
		11/30	248	4	40	9.6	82	9.4	8.1	154	732	.01	460,000
		12/2	241	4		9.7	84	11.	8.	-	-	.01	93,000
		12/5	244	2	55	10.	83	11.	8.1	202	718	.01	93,000
		12/7	244	2		9.5	79	14.	8.	-	-	.02	430,000
		12/8	243	0	65	10.4	82	13.	8.1	305	718	.01	230,000
		12/13	188	0	20	7.4	57	12.	7.9	158	760	.01	230,000
		12/15	216	0		6.5	51	11.	7.9	-	-	.02	23,000
		12/19	245	1		13.5	107	3.	8.1	-	-	-	910
		12/20	188	0		10.7	84	3.3	8.1	-	-	-	21,000

South Platte River -Sedgwick, Colo.-bridge on State Hwy. 59	SP 105.6	5/10	87	14	20	9.3	101	2.6	8.3	232	761	.01	930
		5/13	54	14		9.	99	1.3	8.3	-	-	.02	930
		5/18	108	16	9	9.1	105	1.7	8.3	192	646	.03	1,500
		5/23	353	20	20	7.4	92	2.3	8.3	243	665	.02	4,300
South Platte River - Peterson Canal Inlet	SP 103.6	7/11	88	26	45	6.5	90	3.3	8.3	226	427	.03	24,000
		7/13	103	28		7.2	101	4.2	8.4	-	-	.04	24,000
		7/20	95	28	7	6.7	95	2.9	8.4	230	522	.02	11,000
		7/22	102	26		7.3	100	2.3	8.4	-	-	.01	430
		7/26	70	27	5	8.4	117	4.7	8.3	175	399	.03	460
		7/28	61	23		8.3	109	2.4	8.4	-	-	.01	930
		8/2	51	26	25	8.3	144	3.7	8.3	186	561	.01	460
		9/27	20	16	4	7.9	91	4.1	8.3	180	532	.01	460
		9/29	20	16		7.	80	1.7	8.4	-	-	.01	930
		10/4	20	17	15	9.7	113	2.1	8.4	191	522	.01	2,400
		10/6	20	18		11.6	136	3.2	8.3	-	-	.01	930
		10/10	20	14	25	11.8	127	4.2	8.3	289	551	.04	46,000
		10/12	20	12		14.1	149	1.7	8.2	-	-	.01	4,300
		10/14	20	12	10	17.6	184	1.8	8.4	183	503	.03	2,400
		10/17	20	13	15	17.7	189	2.6	8.4	240	637	.02	430
		10/18	20	16		9.	102	.7	8.3	-	-	.01	46,000
South Platte River - Ovid, Colo. Bridge on State Hwy. 23	SP 98.1	5/10	112	15	10	9.3	104	2.3	8.3	162	846	.02	2,300
		5/13	79	16		9.	102	6.3	8.3	-	-	.03	150
		5/18	127	16	8	9.7	111	1.4	8.3	193	617	.03	430
		5/25	370	16		8.2	94	2.4	8.3	-	-	.03	930
		10/10	356	12		9.4	97	4.6	8.3	247	542	.04	110,000
		10/12	413	12	80	9.5	98	3.8	8.2	-	-	.02	75,000
		10/14	438	12	40	9.5	99	2.6	8.3	176	484	.02	15,000
		10/17	380	12	35	9.5	100	3.7	8.3	245	513	.02	75,000
		10/18	377	14		9.	99	3.1	8.3	-	-	.03	43,000
		11/30	350	4	25	12.1	104	3.3	8.2	146	704	.01	4,300
		12/2	343	4		12.2	105	3.8	8.2	-	-	.01	24,000
		12/5	346	2	30	12.3	99	4.8	8.2	192	690	.01	15,000
		12/7	346	2		12.1	99	4.3	8.2	-	-	.01	46,000
		12/8	345	0	55	12.3	95	4.8	8.2	291	677	.01	24,000
		12/13	348	2	20	10.5	86	3.1	7.9	147	565	.05	24,000
		12/15	297	2		11.	90	2.9	7.9	-	-	.02	15,000
		12/19	347	2		11.6	93	2.3	8.1	-	-	-	9,300
		12/20	248	1		11.7	93	3.2	8.1	-	-	-	43,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
South Platte River -Julesburg, Colo. At bridge on State Route 51.	SP 90.	5/10	166	15	8	9.5	106	1.8	8.3	198	846	0.04	2,300
		5/13	149	16		8.6	98	1.4	8.3	-	-	.02	430
		5/18	146	17	30	8.6	100	3.1	8.3	196	598	.04	1,500
		5/25	475	18		8.1	97	3.7	8.2	-	-	.02	4,300
		10/12	497	13		8.6	91	13.	8.2	-	-	.04	930,000
		10/14	459	12	55	8.	85	8.6	8.2	182	352	.04	930,000
		10/17	420	14	40	7.5	81	10.	8.3	200	342	.03	230,000
		10/18	411	16		6.8	78	11.	8.2	-	-	.02	460,000
		11/30	375	7	55	8.4	78	15.	8.2	164	690	.05	240,000
		12/2	365	6		8.4	77	14.	8.2	-	-	.02	43,000
		12/5	364	4	30	9.1	79	14.	8.1	202	732	.05	430,000
		12/7	378	2		9.	75	17.	8.1	-	-	.06	93,000
		12/8	374	1	55	11.	88	6.2	8.1	296	677	.05	43,000
		12/13	250	0	30	11.2	87	3.8	8.	137	552	.01	9,300
		12/15	301	2		11.1	91	3.6	8.1	-	-	.01	9,300
		12/19	420	2		11.6	96	3.8	8.1	-	-	-	4,300
		12/20	278	1		11.2	89	3.1	8.1	-	-	-	Indeterm.
South Platte River - Western Canal Inlet	SP 84.5	7/11	267	26	140	7.	96	2.8	8.3	230	408	.03	110,000
		7/13	204	28		7.2	101	3.1	8.4	-	-	.03	46,000
		7/20	133	28	45	7.7	108	2.8	8.4	229	408	.05	24,000
		7/22	106	26		8.	109	1.7	8.3	-	-	.01	93,000
		7/26	117	26	15	8.6	118	2.5	8.3	222	276	.02	15,000
		7/28	103	27		9.2	127	2.5	8.4	-	-	.01	24,000
		8/2	76	27	15	10.8	149	2.9	8.2	128	371	.01	46,000
		9/27	66	19	10	8.3	100	2.6	8.3	246	475	.01	24,000
		9/29	85	18		8.1	96	1.9	8.4	-	-	.01	43,000
		10/4	80	18	25	9.	107	2.2	8.4	216	447	.01	39,000
		10/6	76	18		8.8	106	2.4	7.3	-	-	.02	23,000
		10/10	103	12	100	8.8	93	Depl.	8.3	234	513	.01	93,000
		10/12	122	12		8.1	85	Depl.	8.2	-	-	.03	460,000

South Platte River -Big Springs, Nebr. Bridge on road south of town.	SP 77.2	5/10	222	16	15	9.3	107	1.8	8.3	230	846	.02	4,300
		5/13	123	17		8.4	98	2.	8.3	-	-	.02	4,300
		5/18	93	19	8	9.2	112	1.9	8.3	206	608	.02	930
		5/25	451	20		8.5	106	3.5	8.3	-	-	.02	2,100
South Platte River - Ogallala, Nebr. -bridge on State hwy. south of town.	SP 57.2	5/9	268	18	35	9.7	114	2.3	8.3	214	657	.05	4,300
		5/12	334	23		8.6	103	2.3	8.4	-	-	.04	150
		5/17	254	20	90	8.2	103	2.	8.4	201	523	.02	11,000
		5/20	235	16	4	8.	91	3.9	8.1	322	447	.03	46,000
		12/1	346	6	10	15.9	141	2.3	8.4	182	620	.01	23,000
		12/6	340	3		13.	108	4.	8.3	-	-	.01	24,000
		12/9	381	0	2	12.1	94	2.8	8.2	207	690	.01	15,000
		12/14	123	0		15.7	120	3.3	8.1	330	760	.01	4,300
South Platte River - Hollingsworth Canal inlet, Ogallala, Nebr.	SP 56.7	7/12	7.1	26	80	7.3	101	3.8	8.3	168	390	.05	110,000
		7/21	2.2	28	250	7.9	111	6.4	8.4	218	532	.02	Indeterm.
		7/25	0.4	26	120	7.5	104	7.3	8.4	214	494	.04	75,000
		7/27	5.6	24		8.2	109	5.3	8.2	-	-	.01	43,000
		7/29	12.2	22	3	8.7	110	3.1	8.3	155	-	.01	23,000
		8/1	10.6	22		9.5	122	3.7	8.3	-	475	.02	2,100
		9/30	12	14		10.2	111	2.9	8.3	-	-	.01	23,000
		10/3	20	17	20	9.8	113	2.8	8.4	194	456	.01	7,500
		10/5	23	18	25	9.9	117	3.7	8.3	195	475	.01	4,300
		10/11	23	12	30	10.3	105	5.4	8.3	225	484	.03	46,000
		10/13	23	13		10.1	106	4.	8.3	-	-	.02	9,300
South Platte River - bridge on County road south of Roscoe, Nebr.	SP 49.2	5/9	296	18	30	9.	107	2.3	8.3	205	614	.01	2,300
		5/12	411	20		8.2	101	2.8	8.4	-	-	.03	430
		5/17	310	20	70	8.3	103	1.8	8.3	210	588	.02	2,300
		5/20	297	16	2	9.2	104	2.4	8.3	219	570	.01	24,000
South Platte River - bridge on County road south of Sutherland, Nebr.	SP 23.8	5/9	179	17	10	9.	105	2.7	8.1	224	359	.02	3,900
		5/12	109	17		8.9	103	1.5	8.1	-	-	.02	110
		5/17	134	16	7	9.1	102	1.3	8.1	222	323	.04	290
		5/20	97	14		8.8	95	2.5	8.	225	257	.02	430
South Platte River -bridge on Co. road south of Hershey, Nebr.	SP 17.2	5/9	242	17	25	9.5	111	2.6	8.2	214	377	.01	2,300
		5/12	154	19		8.7	105	1.7	8.3	-	-	.03	91
		5/17	194	15	20	8.9	99	1.2	8.3	224	351	.1	93
		5/20	139	14		9.4	101	1.2	8.3	218	304	.02	230

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity, ppm.	(11) Hardness, ppm.	(12) Copper, ppm.	(13) Coliforms M.P.N. per 100 ml.
South Platte River - North Platte, Nebr. Bridge south of town.	SP 4.	5/9	306	16	30	9.3	106	3.	8.2	210	341	0.03	2,300
		5/12	236	17		8.6	100	1.6	8.3	-	-	.04	230
		5/17	306	16	45	8.7	98	2.	8.3	206	370	.02	11,000
		5/20	204	14		9.	99	1.2	8.3	213	295	.01	210
		9/26	336	16	4	8.8	97	1.4	8.3	222	390	.03	230
		9/28	298	14	15	9.4	103	1.3	8.3	218	371	.02	93
		10/3	199	17	5	8.6	99	1.3	8.4	216	323	.03	2,400
		10/5	176	16	20	8.6	94	.6	8.3	216	276	.02	430
		10/11	424	12	45	9.6	101	1.6	8.3	205	352	.04	2,400
		10/13	498	12		9.6	100	1.4	8.3	-	-	.02	11,000
		12/1	135	6	8	13.8	122	1.1	8.3	224	318	.01	230
		12/6	135	2		12.6	102	.9	8.3	-	-	-	1,500
		12/9	151	0	4	12.6	98	.6	8.2	242	318	.04	43
		12/14	140	0		12.4	95	1.8	8.1	227	332	.01	230
South Platte River - Power Canal at Paxton, Nebr.		5/9	1500	19	30	8.8	106	2.3	8.2	200	559	.02	430
		5/12	1300	18		9.1	109	3.8	8.3	-	-	.03	2,900
		5/17	1300	18	45	8.9	106	3.1	8.3	154	560	.02	4,300
		5/20	1330	15	1	9.4	105	3.6	8.3	212	351	.01	2,300
		9/28	1140	16	5	8.9	101	1.5	8.4	184	152	.07	23
		9/30	1140	15		8.7	96	2.1	8.4	-	-	.01	43
		10/3	1480	17	6	8.8	101	2.3	8.4	190	133	.01	430
		10/5	1460	15	7	9.	99	3.4	8.	187	143	.01	120
		12/1	1470	7	6	11.5	106	2.	8.4	215	234	.03	43
		12/6	1470	6		11.9	104	2.5	8.4	-	-	.01	23
		12/9	1480	3	10	12.3	102	2.2	8.4	216	234	.01	43
		12/14	1030	2.		13.2	108	2.5	8.4	216	249	.02	9
South Platte River -Sutherland Reservoir Outlet.		7/8	1230	24	4	7.2	97	4.	8.4	170	285	.04	240
		7/12	1190	26		7.9	107	3.	8.6	-	-	.04	43
		7/14	1180	23	20	7.7	99	4.8	8.4	181	313	.03	75
		7/19	1140	25	6	8.	108	5.9	8.4	175	314	.03	150
		7/21	1110	22		7.7	98	2.4	8.4	-	-	.03	23

		7/25	1230	26	25	7.8	108	4.2	8.4	174	323	.03	4,600
		7/27	1250	24		8.	107	2.4	8.4	-	-	.04	23
		7/29	1270	22	20	7.9	101	3.	8.4	158	-	.01	93
		8/1	1250	22		7.9	102	2.1	8.4	-	323	.03	43
		9/26	1210	17	25	8.9	102	3.2	8.3	179	133	.01	93
		9/28	1200	17	20	8.8	101	3.6	8.4	182	152	.01	430
		9/30	1290	15		9.1	101	3.1	8.4	-	-	.01	750
		10/3	1270	16	30	9.	101	2.6	8.4	183	143	.01	430
		10/5	980	16	30	8.6	98	3.	8.4	179	162	.02	230
		10/11	1	12	20	6.4	66	2.3	7.9	206	209	.02	11,000
South Platte River - Tailrace ditch from Power Plant, North Platte, Nebraska	SP 3.5	5/9	1040	15	50	10.1	113	3.5	8.4	184	353	.01	36
		5/12	1000	16		9.2	106	4.5	8.4	-	-	.07	43
		5/17	1020	17	55	8.9	103	4.5	8.3	170	370	.03	430
		5/20	1020	16	40	8.6	98	5.3	8.3	176	257	.04	230
		7/8	1040	27	2	7.1	99	4.1	8.4	132	257	.05	240
		7/12	740	24		7.4	99	4.	8.5	-	-	.05	11,000
		7/14	930	25	25	8.1	110	4.8	8.4	163	276	.04	240
		7/19	1080	24	4	7.8	104	4.5	8.4	164	285	.02	150
		7/21	1100	22		8.	103	2.7	8.4	-	-	.03	75
		7/25	1280	24	35	8.	106	4.7	8.4	161	314	.01	1,100
		7/27	1290	24		7.9	104	3.3	8.3	-	-	.03	240
		7/29	1320	20	25	7.8	97	2.9	8.3	123	314	.01	390
		8/1	1210	22		8.	106	4.1	8.4	-	-	.03	460
		9/26	1235	16	25	9.	103	4.5	8.3	194	162	.03	460
		9/28	1220	13	30	9.	97	3.8	8.3	178	162	.01	93
		9/30	380	14		9.3	100	3.3	8.4	-	-	.03	2,400
		10/3	940	16	8	9.1	103	3.6	8.4	184	143	.02	230
		10/5	620	16	35	8.8	96	2.9	8.4	180	152	.04	930
		10/11	627	12	45	9.6	99	3.5	8.4	184	171	.04	930
		10/13	40	13		6.1	65	1.9	7.9	-	-	.01	150
		12/1	1537	6	20	12.	105	2.6	8.4	203	318	.02	75
		12/6	1293	4		12.4	98	2.5	8.4	-	-	.01	21
		12/9	1800	2	9	13.1	104	2.5	8.4	206	332	.01	15
		12/14	1200	4		13.4	114	2.8	8.4	227	318	.03	29
Platte River - Inlet Supply Canal -N. Platte, Nebr. Below junction of N. and S. Platte Rivers		7/15	2016	24	1	7.6	96	3.6	8.2	112	142	.03	4,300
		7/19	2004	24	4	7.3	96	3.9	8.2	185	181	.03	15,000
		7/21	2007	22		7.8	100	2.4	8.4	-	-	.03	4,300
		7/25	1999	24	20	7.1	96	2.5	8.3	188	162	.02	2,400
		7/27	2008	24		6.9	90	1.6	8.1	-	-	.04	11,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat						
Platte River - Inlet Supply Canal, North Platte, Nebr. Below junction of North and South Platte Rivers (Cont.)		7/29	2013	22	1	6.3	81	2.2	8.2	200	181	0.01	15,000
		8/1	2040	22		7.3	94	2.7	8.2	-	-	.07	11,000
		9/26	1368	16	10	8.9	101	4.8	8.3	196	228	.04	9,300
		9/28	1468	13	15	9.2	98	3.3	8.3	179	219	.01	9,300
		9/30	1664	10		9.	90	6.1	8.3	-	-	.03	110,000
		10/3	1735	16	15	8.5	93	5.7	8.3	185	199	.01	43,000
		10/5	1937	15	25	8.4	93	3.9	8.2	184	181	.02	23,000
		10/11	2036	11	20	9.5	96	2.6	8.2	177	162	.02	4,300
		10/13	1733	12		9.6	99	4.4	8.3	-	-	.01	2,300
		12/1	1722	4	15	11.6	99	3.5	8.3	202	290	.01	4,600
		12/6	1733	2		12.5	101	2.2	8.3	-	-	.03	4,300
		12/9	1570	0	10	13.2	101	2.8	8.3	216	318	.01	9,300
		12/14	1483	0		12.9	99	3.	8.3	224	318	.05	9,300
T R I B U T A R I E S													
Bear Creek - crossing at gage near mouth.	BE 0.75	1948 12/29	12	2		11.1	97	4.	7.3	-	-	-	93
		1949 2/24	12	5		11.3	108	2.3	7.8	-	-	-	2,300
		2/28	10	4		11.4	106	3.1	7.9	-	-	-	2,300
		3/3	9.4	5		10.3	99	3.7	8.	-	-	-	430
		3/7	9	6		10.8	106	>7.6	7.9	-	-	-	2,300
		3/10	9.2	4		11.	103	2.3	8.	-	-	-	1,500
		3/14	9.2	5		11.	109	2.2	8.	-	-	-	4,300
		3/17	9.5	6	<25	11.6	114	1.6	8.1	-	-	-	930
		3/21	9	8		11.4	118	2.	8.	-	-	-	2,300
		3/24	9.7	6		11.4	112	2.5	8.	-	-	-	230
		3/28	9.7	6		10.8	106	1.9	8.	262	262	.08	1,200
		3/31	9.8	5		12.2	118	.3	7.9	-	-	.08	930

		4/4	10	7		12.5	126	3.7	-	-	-	-	4,300
		4/7	9.5	10		12.4	134	2.2	8.2	-	-	-	930
		4/11	9.7	8		12.8	133	2.4	8.1	244	253	-	4,300
		4/14	9.0	5		9.0	87	2.8	7.8	226	276	.08	230
		4/18	8.0	11		12.7	141	3.5	8.2	258	253	.12	1,500
		4/21	8.2	11		12.	134	5.3	8.2	250	253	.14	230
		4/25	8.0	16		12.8	158	4.2	8.4	-	-	-	4,300
		4/28	10	12		11.1	126	4.6	8.1	-	-	-	23,000
		5/2	5.0	14		12	143	2.7	8.4	-	-	-	2,300
		5/5	5.0	12	31	8.4	95	6.1	8.	-	-	-	9,300
		5/9	6.0	12	20	11.5	130	2.5	8.	228	230	.01	4,300
		5/12	992	11		-	-	-	-	-	-	-	4,300
		5/16	330	13		9.3	108	1.2	-	-	-	-	7,500
		5/19	330	13		8.3	96	3.3	7.6	-	-	-	4,300
		5/23	235	16		8.9	110	1.3	-	-	-	-	4,300
		5/26	125	16		5.9	73	3.	-	-	-	-	9,300
		6/2	65	11		8.9	99	1.4	8.1	-	-	-	23,000
		6/6	555	13		8.1	94	4.1	8.	-	-	-	3,900
		6/27	100	17		7.5	95	1.	7.5	-	-	-	430
		7/7	E 150	18		7.8	99	1.6	7.5	-	-	-	9,300
		7/14	E 140	17		7.9	98	1.3	-	-	-	-	4,300
		7/20	E 100	19		7.7	100	1.2	7.7	-	-	-	75,000
		7/27	E 50	19		8.2	106	1.8	7.6	-	-	-	43,000
		8/11	E 107	19		7.5	99	1.8	7.9	-	-	-	39,000
		8/18	E 108	17		9.2	116	1.6	-	-	-	-	930
		8/25	E 52	17		9.3	117	1.9	-	-	-	-	23,000
		8/29	E 10	16		9.5	118	1.8	-	-	-	-	2,300
Cherry Creek - crossing at Lawrence Street, Denver	CH 1.	3/31	16	5		11.2	106	13	8.	-	-	.26	9,300
		4/4	8.2	6		10.8	104	2.4	-	-	-	-	2,300
		4/7	19	13		9.2	105	1.4	8.2	-	-	-	4,300
		4/11	27	9		10.	104	3.8	7.9	168	161	-	2,300
		4/14	16	7		9.4	93	2.8	7.9	164	253	.18	4,300
		4/18	9.0	11		10.5	114	7.3	8.2	140	138	.14	93,000
		4/21	8.6	12		10.3	115	1.9	8.2	206	207	.14	2,300
		4/25	5.4	16		8.1	99	3.0	8.6	-	-	-	2,300
		4/28	6.2	13		9.8	112	2.5	8.1	-	-	-	23,000
		5/2	5.8	16		6.6	80	3.3	8.6	-	-	-	4,300
		5/5	7.0	12	220	6.8	75	51.	7.8	-	-	-	230,000

E = Estimated

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cherry Creek - crossing at Lawrence St., Denver -(Cont.)	CH 1. (Cont.)	5/9	39	15	220	7.8	93	1.6	8.	168	230	0.1	7,500
		5/12	426	14	-	-	-	-	-	-	-	-	23,000
		5/16	92	16	-	8.8	107	2.3	-	-	-	-	93,000
		5/26	15	20		4.2	55	3.1	-	-	-	-	23,000
		6/2	14	14	-	9.	105	3.2	8.1	-	-	-	15,000
		6/6	78	14	-	8	93	2.6	8.2	-	-	-	43,000
		6/13	59	16	-	7.4	90	1.7	7.9	-	-	-	93,000
Burlington O'Brian Ditch - Neres Canal, Barr Lake Outlet (East)		6/7	70	14	600	6.1	70	5.2	7.4	82	96	-	93,000
		6/9	86	15	2300	5.3	62	14.	7.4	-	-	-	1,100,000
		6/13	0	16	500	6.1	73	4.5	7.5	69	87	-	21,000
		6/15	25	17	220	6.4	78	2.7	7.5	-	-	-	23,000
		6/17	20	22	10	6.8	91	2.1	7.9	-	-	-	4,300
		6/21	25	20	30	7.4	97	3.5	8.	177	185	-	2,300
		6/23	44	20	20	4.6	59	2.9	7.7	-	-	-	23,000
		6/28	55	22	20	5.1	68	5.1	7.8	168	183	.04	24,000
		6/30	89	22	25	6.2	82	4.9	7.9	-	-	.01	2,300
		7/5	53	22	20	6.8	92	5.5	7.8	142	242	.01	4,300
		7/8	58	22	10	8.2	110	4.6	8.2	-	-	.01	9,300
		7/14	35	22	25	8.2	110	4.	8.3	-	-	.04	4,600
		7/19	70	23	20	9.9	135	7.6	8.7	146	187	.02	750
		7/21	67	20	20	5.9	77	3.8	8.1	-	-	.01	2,400
		7/25	56	23	25	9.6	131	16.	8.8	140	187	-	-
		7/27	63	22	15	7.1	96	13.	8.7	-	-	-	-
		7/29	57	22	15	5.7	76	2.6	8.6	-	-	-	-
		8/2	0	22	10	7.2	97	4.1	8.7	143	187	.03	4,300
		8/4	42	24	30	8.1	112	6.1	8.8	-	-	.03	21,000
		8/8	84	24	20	10.6	146	> 7.5	9.1	146	221	.02	24,000
		8/10	84	24	20	7.9	108	7.	8.9	-	-	.02	4,300
		8/12	78	24	30	7.6	106	4.9	9.	-	-	.02	12,000
		8/16	79	22	25	9.	121	4.5	9.	152	255	.04	2,300
		8/18	75	22	35	7.9	107	5.8	9.	-	-	.02	2,300

		8/22	63	23	30	11.9	162	8.8	9.3	158	153	.01	430
		8/26	49	22	20	9.6	130	6.7	9.4	-	-	.02	430
		8/30	0	22	30	6.7	89	4.1	9.1	-	-	.07	24,000
		9/6	51	19	40	6.6	84	3.6	9.1	152	255	.01	3,900
		9/8	59	19	35	8.	101	3.9	9.3	-	-	.01	2,300
		9/21	46	15	35	8.5	100	4.	9.1	157	221	-	9,300
		9/23	52	16	30	8.6	101	3.6	9.2	-	-	.05	4,300
Burlington O'Brian Ditch - Speer Canal, Barr Lake Outlet (West)		6/15	40	18	5	7.6	96	1.8	7.9	180	189	-	2,900
		6/17	40	22	5	8.2	109	1.6	8.	-	-	-	430
		6/21	40	20	15	7.6	99	2.1	8.	177	175	-	230
		6/23	46	20	5	7.	90	2.2	7.8	-	-	-	230
		6/28	68	22	10	6.5	86	4.4	7.9	163	183	.03	1,500
		6/30	68	22	20	6.4	86	3.9	7.9	-	-	.03	280
		7/5	65	22	10	5.8	73	5.1	7.7	156	183	.02	24,000
		7/8	65	22	10	6.2	84	2.9	8.	-	-	.01	2,300
		7/12	55	22	20	8.1	110	4.6	8.2	156	272	.01	430
		7/14	48	22	25	8.6	117	3.6	8.3	-	-	.03	430
		7/19	45	24	20	9.5	130	> 7.8	8.8	146	187	.03	4,600
		7/21	0	22	20	5.	67	4.5	8.	-	-	.01	9,300
		7/25	65	23	15	8.5	116	9.2	8.8	144	187	-	-
		7/27	65	23	15	7.2	98	6.	8.7	-	-	-	-
		7/29	75	22	10	7.3	98	2.	8.7	-	-	-	-
		8/2	67	24	5	8.	111	3.5	8.8	138	187	.03	930
		8/4	65	24	25	7.9	109	7.	8.8	-	-	.03	930
		8/8	60	24	25	7.4	102	3.8	8.9	148	221	.06	2,900
		8/10	60	24	20	8.9	123	6.2	9.	-	-	.03	440
		8/12	60	24	35	9.2	127	5.8	9.1	-	-	.02	430
		8/16	60	23	20	7.8	107	2.7	9.	151	255	.04	2,300
		8/18	60	22	35	8.2	111	4.6	9.1	-	-	.05	230
		8/26	0	22	25	8.8	119	6.1	9.4	-	-	.02	2,100
		8/30	70	22	20	6.4	86	3.	9.1	150	255	.01	4,300
		9/6	70	19	35	6.5	82	2.6	9.1	151	238	.05	930
		9/13	0	18	45	8.7	108	3.9	9.3	154	357	.02	4,300
		9/15	0	18	50	8.4	104	4.2	9.2	-	-	.02	930
		9/21	75	17	30	8.4	102	3.	9.1	158	204	.05	9,300
		9/23	60	16	30	8.4	100	2.7	9.1	-	-	.03	4,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Burlington - O'Brian Ditch, Inlet to Barr Lake Reservoir	14.	1948											
		12/16	70	2.		0	0	106	7.7	-	-	-	360,000
		12/23	0	2		0	0	109	7.6	-	-	-	230,000
		12/29	215	1		.7	6	70	7.6	-	-	-	430,000
		12/31	170	1		.9	7	68	7.5	-	-	-	430,000
		1949											
		2/2	130	3		.3	3.	86	-	-	-	0.14	1,500,000
		2/16	160	5		0	0	80	-	-	-	-	4,600,000
		3/2	No	10		0	0	68	7.4	-	-	-	23,000
		3/16	data	8		0	0	35	7.2	-	-	-	43,000
		4/13	152	11		0	0	54	-	178	230	.16	430,000
		4/28	48	16		6.	74	>23	7.8	-	-	-	Indeterm.
		5/25	120	15		1.8	21	-	7.5	-	-	-	750,000
		*6/8	70	15		4.3	51	2.8	7.6	-	-	-	430,000
		*6/23	95	18		5.	64	3.8	7.5	-	-	-	9,300
		*6/29	250	19		6.	78	2.2	7.2	-	-	-	93,000
		#6/30	210	21	130	5.5	72	17.4	7.7	-	-	.01	21,000
		*7/11	65	19		6.3	81	3.6	7.4	-	-	-	43,000
		*7/21	180	19		6.	77	2.1	8	-	-	-	43,000
		*7/25	140	22		4.	55	2.8	7.8	-	-	-	930,000
		#7/5	240	22	160	5.7	76	3.2	7.7	88	157	.02	43,000
		#7/8	230	20	220	5.4	71	3.5	7.7	-	-	.01	240,000
		#7/12	95	21	200	5.3	69	6.6	7.7	109	204	.01	93,000
		#7/14	140	20	190	5.4	70	4.	7.9	-	-	.04	93,000
		#7/19	160	22	65	5.7	76	3.	7.9	122	187	.02	23,000
		#7/21	180	20	100	5.7	74	2.4	7.9	-	-	.01	240,000
		#7/25	140	23	40	3.8	52	4.4	7.8	132	181	-	-
		#7/27	95	22	20	1.1	14	5.1	7.7	-	-	-	-
		#7/29	85	22	25	2.2	30	3.6	7.7	-	-	-	-
		#8/2	0	22	20	6.1	82	3.1	8.	149	187	.02	2,300

Burlington-O'Brian Ditch, County Road Crossing near Eno	10.5	1/12	164	4		.6	6	76	7.4	-	-	.16	430,000
		1/19	154	4		2.	19	58	7.4	-	-	-	150,000
		1/26	141	6		2.	19	54	7.4	-	-	-	9,300
		2/2	132	3		.8	7	97	7.3	-	-	.1	430,000
		2/16	66	6		0	0	78	7.4	-	-	-	11,000,000
		6/23	98	18		5.1	68	-	-	-	-	-	9,300
Burlington-O'Brian Ditch Crossing on Co. road west of U.S. Hwy. 6	8.7	1/12	170	4		3.1	28	42	7.4	-	-	.2	150,000
		1/19	159	5		3.3	31	47	7.5	-	-	-	43,000
		1/26	141	6		2.3	22	41	7.4	-	-	-	93,000
		2/2	136	3		4.4	39	66	7.3	-	-	.12	43,000
		2/16	72	6		1.5	15	57	7.6	-	-	-	4,600,000
		4/13	162	12		.8	9	29	-	166	230	.18	93,000
		5/11	—	16		1.	12	28	7.4	-	-	-	430,000
		5/25	67	16		3.8	46	-	7.5	-	-	-	93,000
		6/29	710	17		6.9	86	2.1	7.	-	-	-	2,300
		7/11	340	19		6.8	88	2.4	7.2	-	-	-	93,000
		9/1	-	16		2.9	35	15	-	-	-	-	4,600,000
Burlington-O'Brian Ditch, Crossing at Dupont	4.8	1/12	185	3		4.8	43	30	7.4	-	-	.18	150,000
		1/19	160	6		4.4	43	42	7.4	-	-	-	930,000
		1/26	130	6		3.8	37	46	7.5	-	-	-	230,000
		2/2	140	3		3.4	30	47	7.4	-	-	.14	43,000
		2/16	75	7		2.7	27	40	7.5	-	-	-	4,600,000
		3/2	100	10		1.3	14	29	7.5	-	-	-	43,000
		6/23	160	16		6.3	76	3.	7.9	-	-	-	43,000
		7/21	360	19		7.1	93	2.3	7.9	-	-	-	23,000
		9/7	68	18		1.4	18	-	-	-	-	-	4,600,000
Burlington-O'Brian Ditch Crossing on Co. road west of Adams City	3.	1/12	185	3		6.1	54	35	7.4	-	-	.22	930,000
		1/19	160	6		4.6	44	65	7.4	-	-	-	930,000
		1/26	130	6		5.3	52	46	7.4	-	-	-	23,000
		2/2	140	3		5	45	51	7.4	-	-	.14	23,000
		2/16	75	8		4.3	46	42	7.6	-	-	-	2,400,000
		3/2	100	10		5.1	54	35	7.5	-	-	-	9,300
		4/13	211	12		3.9	43	28	-	164	253	.24	43,000
		4/27	48	13		4.3	49	24	-	-	-	-	43,000
		5/11	123	16		3.2	39	14	7.4	-	-	-	230,000
		5/25	79	18		4.9	62	-	7.6	-	-	-	43,000

* These samples analyzed by State Laboratory.

♯ These samples analyzed by P.H.S. Laboratory, Greeley

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Tur- bid- ity, ppm.	(7) Dissolved Oxygen		(8) 5-Day BOD ppm.	(9) pH	(10) Alka- lin- ity, ppm.	(11) Hard- ness, ppm.	(12) Cop- per, ppm.	(13) Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Burlington-O'Brian Ditch, Crossing near intake at York St., Denver	0.5	1948											
		12/29	196	11		4.7	52	174	7.3	-	-	-	93,000
		1949											
		1/5	115	9		6.	63	88	7.7	-	-	0.2	930,000
		1/10	165	[illegible]		4.8	45	92	7.5	-	-	.26	Indeterm.
		1/12	185	0		7.	57	33	7.5	-	-	.18	230
		1/13	185	10		5.3	56	95	7.4	-	-	.18	43,000
		1/17	160	8		5.1	52	100	7.6	-	-	.02	9,300
		1/19	160	6		5.	49	100	7.6	-	-	-	4,600,000
		1/20	150	7		5.5	54	90	7.6	208	227	.12	4,300
		1/26	130	6		6.5	63	63	7.6	-	-	-	30
		1/31	140	6		5.4	52	88	7.6	-	-	.16	930,000
		2/2	140	2		6.6	57	65	7.4	-	-	.14	230
		2/3	140	6		5.8	56	100	7.6	204	-	.14	230
		2/7	100	8		6.2	63	71	7.8	-	-	.12	930
		2/9	40	8		5.4	55	71	7.6	-	-	-	-
		2/14	75	7		5.1	51	85	7.7	-	-	-	4,600,000
		2/16	75	9		5.9	62	45	7.5	-	-	-	930,000
		2/21	150	11		5.7	63	72	7.6	-	-	-	4,600,000
		2/24	200	10		6.7	71	54	7.6	-	-	-	23,000
		2/28	100	10		6.9	73	43	7.6	-	-	-	150
		3/2	100	12		6.	67	67	7.4	-	-	-	930
		3/3	100	11		6.3	69	54	7.5	-	-	-	23,000
		3/7	100	11		6.	66	37	7.5	-	-	-	750
		3/10	225	8		6.2	64	33	7.6	-	-	-	430,000
		3/14	225	10		6.3	68	44	7.5	-	-	-	930
		3/16	225	10		5.7	62	32	7.5	-	-	-	75,000
		3/17	225	10	108	6.1	65	>70	7.7	-	-	-	39,000
		3/21	225	12		5.5	61	-	7.8	-	-	-	120,000
		4/4	150	11		5.8	63	>14	-	-	-	-	15,000
		4/7	150	14		5.6	66	69	7.8	-	-	-	11,000,000

		4/11	225	11		6.9	75	47	7.8	188	161	-	210,000
		4/13	211	12		5.5	61	30	-	172	230	.12	2,300
		4/14	250	10		6.2	66	43	7.4	148	230	.18	43,000
		4/18	211	14		3.9	45	66	7.6	180	161	.24	430,000
		4/21	28	15		4.	47	69	7.4	196	184	.18	4,300
		4/25	75	17		3.7	46	70	7.6	-	-	-	230,000
		4/27	48	12		6.7	74	22	7.8	-	-	-	93,000
		5/2	125	18		3.8	48	85	7.5	-	-	-	43,000
		5/5	28	12	200	4.6	51	100	7.4	-	-	-	430,000
		5/9	245	17	118	5.3	66	40	7.7	164	207	.16	230,000
		5/11	108	17		5.6	70	11	7.4	-	-	-	150,000
		5/12	171	13		-	-	-	-	-	-	-	93,000
		5/16	300	15		7.4	88	-	-	-	-	-	43,000
		5/19	210	15		7.6	90	65	7.5	-	-	-	43,000
		5/23	310	15		7.2	86	3.7	-	-	-	-	23,000
		5/25	146	19		6.6	85	-	7.5	-	-	-	23,000
		5/26	28	18		4.6	58	22	-	-	-	-	93,000
		6/2	28	13		8.	91	22	7.5	-	-	-	43,000
		6/6	376	14		7.1	83	1.6	7.9	-	-	-	9,300
		6/8	240	14		7.3	85	8.5	7.6	-	-	-	43,000
		6/13	181	17		6.4	80	3.8	7.7	-	-	-	23,000
		6/16	146	17		7.	87	.8	-	-	-	-	9,300
		6/20	116	17		7.7	95	.8	7.4	-	-	-	9,300
		6/23	230	17		7.6	94	3.8	7.6	-	-	-	7,500
		6/29	735	19		7.7	100	1.4	7.2	-	-	-	93,000
		7/11	375	20		7.6	101	7.5	7.6	-	-	-	75,000
		7/21	570	20		7.2	95	4.2	7.6	-	-	-	21,000
		7/25	378	22		6.2	84	10.	8.	-	-	-	2,400,000
		8/4	28	20		4.7	61	24.	7.2	-	-	-	4,600,000
		8/8	76	21		4.8	65	16	-	-	-	-	2,400,000
		8/24	68	22		1.9	26	21	-	-	-	-	11,000,000
		9/1	68	16		5.	61	15	-	-	-	-	4,600,000
		9/7	68	18		4.2	53	19	-	-	-	-	4,600,000
Clear Creek - bridge at West edge of Idaho Springs, Colo.	Cl 38.5	1948 12/22	41	0		10.7	94	1.9	6.9	-	-	.12	2,300
		1949 2/23	28	3		10.9	105	.9	7.4	-	-	-	Indeterm.
		3/9	28	2		10.7	100	.7	7.4	-	-	-	73

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Clear Creek - bridge at Western edge of Idaho Springs, Colo. (Cont.)	Cl 38.5 (Cont.)	3/23	31	6	< 20	9.	93	.9	-	-	-	-	91
		4/6	31	6	-	-	-	-	-	-	-	-	< 3
		4/20	45	10		9.4	107	.8	7.4	48	55	-	< 3
		5/4	145	14	20	8.4	105	1.	7.5	-	-	-	230
		5/18	275	11	-	8.4	98	.4	-	-	-	-	36
		6/1	565	12	-	-	-	-	-	-	-	-	230
		6/22	1470	13		9.1	112	.8	-	-	-	-	230
		6/30	1035	13		8.5	104	.7	7.7	-	-	-	430
		7/6	1120	13		7.9	96	.4	6.8	-	-	-	390
		7/13	880	13		8.5	104	.4	7.	-	-	0.12	430
		7/18	585	12		8.4	101	.8	7.4	-	-	-	930
		7/28	380	15		8.6	110	1.2	7.6	-	-	-	430
		8/10	252	13		7.9	96	1.2	7.7	-	-	-	230
		8/17	200	14		8.2	102	.7	-	-	-	-	230
		8/22	149	14		8.2	102	.3	-	-	-	-	430,000
		8/31	128	10		8.3	95	-	7.6	-	-	-	91
		9/8	105	11		8.6	96	.7	-	-	-	-	230
Clear Creek - Crossing on Hwy. 40 below Idaho Springs, Colo.	Cl 33.2	1948 12/22	49	0		10.6	94	1.7	7.3	-	-	.12	4,300
		1949 2/23	33	4		11.1	109	.8	7.2	-	-	-	4,300
		3/9	33	2		10.6	100	1.5	7.4	-	-	-	9,300
		3/23	37	7	24	9.5	101	1.6	-	-	-	-	2,300
		4/6	37	7		-	-	-	-	-	-	-	930
		4/20	55	10		9.6	110	1.	7.2	46	74	-	2,300
		5/4	165	13	20	8.7	106	.8	7.3	-	-	-	4,300
		5/18	330	12		8.4	100	.3	-	-	-	-	9,300
		6/1	665	10		-	-	-	-	-	-	-	9,300
		6/22	1780	12		9.	108	.9	-	-	-	-	9,300
		6/30	1270	13		8.7	106	.9	7.2	-	-	-	9,300
		7/6	1380	13		8.4	102	.4	6.5	-	-	-	2,300

		7/13	1080	14		8.2	102	.4	7.1	-	-	.10	1,500
		7/18	675	13		8.2	101	.4	7.1	-	-	-	12,000
		7/28	445	16		8.4	110	1.3	7.5	-	-	-	23,000
		8/10	286	14		7.9	98	.9	7.5	-	-	-	4,300
		8/17	247	14		8.1	102	.7	-	-	-	-	7,500
		8/22	165	16		8.	104	.3	-	-	-	-	2,300
		8/31	147	12		8.6	103	-	7.7	-	-	-	9,300
		9/8	147	12		8.7	99	.8	-	-	-	-	9,300
Clear Creek - Crossing above Golden, Colo.	Cl 18.	1948											
		12/22	55	3		11.7	104	1.8	7.4	-	-	.12	430
		1949											
		2/23	40	4		11.2	105	1.1	7.2	-	-	-	4,300
		3/9	52	5		11.3	109	2.3	7.5	-	-	-	2,300
		3/23	44	8	< 20	9.9	102	1.4	-	-	-	-	< 3
		4/6	50	10		-	-	-	-	-	-	-	< 3
		4/20	46	14		9.2	109	1.3	7.3	46	83	-	930
		5/4	187	15	35	8.6	104	1.6	7.2	-	-	-	9,300
		5/18	300	14		8.3	98	.7	-	-	-	-	430
		6/1	532	11		-	-	-	-	-	-	-	2,300
		6/8	1278	12		9.1	103	1.	6.8	-	-	-	4,300
		6/20	2675	13		9.3	108	-	7.5	-	-	-	930
		6/22	2138	16		9.2	114	.8	-	-	-	-	2,300
		6/30	1135	16		8.7	107	.5	7.1	-	-	-	750
		7/6	1293	15		8.7	105	.3	6.8	-	-	-	430
		7/13	909	17		8.6	108	.5	7.1	-	-	.14	930
		7/18	615	15		8.3	101	1.	6.9	-	-	-	2,300
		7/28	353	18		8.5	110	1.4	7.5	-	-	-	930
		8/10	279	17		8.1	102	.9	7.4	-	-	-	430
		8/17	401	16		8.3	102	.7	-	-	-	-	[illegible]3,000
		8/22	163	17		7.8	99	.4	-	-	-	-	[illegible]
		8/31	170	14		8.5	99	-	7.6	-	-	-	[illegible]
		9/8	124	14		8.5	101	.9	-	-	-	-	[illegible],300
Clear Creek - Below Golden sewer outfall at Wanamaker ditch intake	Cl 17.5L	1948											
		12/22	10	5	3.	10.6	97	61.	7.3	-	-	.11	430,000
		1949											
		1/6	10	2		10.7	97	12.	7.2	-	-	.14	930,000
		1/19	10	2		10.3	91	>30.	7.3	-	-	-	1,500,000
		1/26	10	0		10.8	91	23	7.3	-	-	-	430,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat						
Clear Creek - Below Golden sewer outfall at Wanamaker ditch intake (Cont.)	Cl 17.5L (Cont.)	2/2	16	0		10.3	87	20	7.5	-	-	0.1	-
		2/9	18	2		10.9	97	62	7.6	-	-	-	4,600,000
		2/16	18	3		10.9	99	28	7.3	-	-	-	2,400,000
		2/23	21	6		10.8	106	43	7.4	-	-	-	93,000
		3/9	10	6		7.4	73	>73	7.4	-	-	-	1,500,000
		3/23	10	10	50	7.2	78	44	-	-	-	-	750,000
		4/6	10*	13		-	-	-	-	-	-	-	11,000,000
		4/20	8*	16		5.5	68	238	7.2	76	92	-	4,600,000
		5/4	11	14	70	8.1	96	7.8	7.1	-	-	-	43,000
		5/18	7	11		8.2	90	-	-	-	-	-	93,000
		6/1	14	12		-	-	-	-	-	-	-	430,000
		6/8	4	12		9.	102	1.	6.6	-	-	-	23,000
		6/16	11	15		5.5	67	1.5	-	-	-	-	9,300
		6/20	8	14		9.1	108	1.4	7.4	-	-	-	93,000
		6/22	12	15		9.1	110	2.	-	-	-	-	23,000
		6/30	10	17		8.6	109	1.6	7.2	-	-	-	23,000
		7/6	12	15		8.5	103	2.8	6.8	-	-	-	75,000
		7/13	11	18		8.4	109	1.3	7.	-	-	.08	43,000
		7/18	10	16		8.	99	4.2	6.9	-	-	-	93,000
		7/28	12	17		-	-	3.3	7.4	-	-	-	93,000
		8/10	12	18		7.3	94	4.1	7.3	-	-	-	210,000
		8/17	14	17		7.5	95	9.1	-	-	-	-	430,000
		8/22	14	19		7.	92	13.	-	-	-	-	430,000
		8/31	11	15		7.5	91	-	7.4	-	-	-	930,000
		9/8	10	15		7.2	87	22.	-	-	-	-	430,000
Clear Creek - below Coors Brewery at Lee, Stewart, and Eakins Ditch intake.	Cl 17.5R	1948 12/22	47	3		10.6	97	15.	7.6	-	-	.11	43,000
		1949 1/6	47	3		10.7	98	13.	7.5	-	-	.1	230,000
		1/19	47	1		10.5	90	23	7.4	-	-	-	150,000
		1/26	42	0		11.	93	24	7.4	-	-	-	430,000

*Flowing into ditch, but dumped back into river.

		2/2	16	-1		9.9	83	21	7.5	-	-	.04	430,000
		2/9	18	2		10.	89	-	7.7	-	-	-	930,000
		2/16	18	3		10.6	96	34	7.2	-	-	-	930,000
		2/23	21	6		10.5	103	44	7.4	-	-	-	430,000
		3/9	44	6		7.8	76	73	7.3	-	-	-	750,000
		3/23	38	10	70	7.2	80	50	-	-	-	-	930,000
		4/6	4.5	13		-	-	-	-	-	-	-	2,100,000
		4/20	4.0	16		5.5	69	67	7.2	76	115	-	2,400,000
		5/4	121	15	65	8.	97	17	7.2	-	-	-	93,000
		5/18	77	12		8.2	92	-	-	-	-	-	930,000
		6/1	9	12		-	-	-	-	-	-	-	93,000
		6/16	0	16		7.1	88	4.9	-	-	-	-	93,000
		6/20	2	14		8.5	101	1.9	7.9	-	-	-	23,000
		6/22	2	15		9.	109	2.6	-	-	-	-	43,000
		6/30	11	17		8.5	108	4.8	7.2	-	-	-	43,000
		7/6	6	16		8.7	108	9.9	6.8	-	-	-	43,000
		7/13	9	18		8.5	110	6.6	6.8	-	-	.12	93,000
		7/18	21	15		8.3	101	2.	6.8	-	-	-	93,000
		7/28	24	17		8.2	103	7.6	7.4	-	-	-	93,000
		8/10	12	18		7.1	92	3.1	7.3	-	-	-	93,000
		8/17	11	17		7.5	95	6.4	-	-	-	-	75,000
		8/22	11	19		6.4	85	14.	-	-	-	-	430,000
		8/31	8	16		7.4	91	-.	7.4	-	-	-	150,000
		9/8	8	15		6.9	84	>15.	-	-	-	-	930,000
Clear Creek - Rocky Mountain ditch intake.	C1 16.1	6/1	40	13		-	-	-	-	-	-	-	430,000
		6/20	16	14		8.8	104	3.6	7.5	-	-	-	9,300
		6/22	47	15		8.9	108	2.9	-	-	-	-	23,000
		6/30	142	17		8.2	104	1.6	7.1	-	-	-	430,000
		7/6	190	16		8.3	102	1.8	7.4	-	-	-	43,000
		7/13	47	19		8.	105	Depl.	7.	-	-	.1	230,000
		7/18	47	16		8.	99	6.2	6.9	-	-	-	93,000
		7/28	63	17		6.9	87	6.1	7.2	-	-	-	93,000
		8/10	27	18		6.	77	2.8	7.3	-	-	-	430,000
		8/17	16	17		5.8	74	4.	-	-	-	-	230,000
		8/22	16	21		5.3	73	4.7	-	-	-	-	43,000
		8/31	9	15		5.3	64	-	7.5	-	-	-	150,000
		9/8	9	15		5.2	64	4.4	-	-	-	-	230,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Clear Creek - Lower Clear Creek & Colo. Agricultural Canal intake	Cl 3.4	6/1	30	14		-	-	-	-	-	-	-	43,000
		6/8	16	13		8.5	97	2.9	7.	-	-	-	43,000
		6/16	16	17		8.	100	1.2	-	-	-	-	23,000
		6/29	23	17		8.2	102	1.2	-	-	-	-	9,300
		7/11	30	16		8.	97	3.8	7.4	-	-	-	23,000
		7/21	27	20		8.	106	3.7	8.	-	-	-	23,000
		7/25	26	20		-	-	2.2	7.6	-	-	-	43,000
		8/4	30	18		7.7	98	4.9	7.8	-	-	-	43,000
		8/8	16	17		7.2	89	1.8	-	-	-	-	93,000
		8/24	15	20		7.4	97	3.	-	-	-	-	930,000
		9/1	6	14		8.2	97	3.1	-	-	-	-	43,000
		9/7	12	16		7.7	93	-	-	-	-	-	23,000
Clear Creek-Crossing on County Road near mouth.	Cl .8	2/23	37	7		11.6	115	4.	7.7	-	-	-	23,000
		3/9	30	6		4.7	46	3.3	8.3	-	-	-	23,000
		3/23	27	11	< 20	2.6	29	3.7	-	-	-	-	930
		4/20	8.2	14		10.4	122	13	7.8	200	230	-	9,300
		5/4	74	17	45	11.	136	2.7	7.7	-	-	-	9,300
		5/18	8	15		8.	96	2.8	-	-	-	-	93,000
		6/1	No data for this period	14		-	-	-	-	-	-	-	39,000
		10/24		10		9.6	102	2.7	8.1	-	-	-	7,500
		11/3		8		9.3	94	3.1	-	-	-	-	2,400,000
		11/10		9		11.	115	3.1	-	-	-	-	43,000
		11/17		9		10.8	113	2.8	7.8	-	-	-	43,000
		12/1		5		10.8	102	5.	-	-	-	-	230,000
St. Vrain Creek Supply Canal intake below Lyons	SV 38.9	6/2	0	12	2	9.3	104	.4	7.1	24	38	-	43
		6/14	60	14	25	9.2	107	.7	7.1	17	9	-	75
St. Vrain Creek -Highland and Rough & Ready Canal intake	SV 38.4	6/2	95	12	5	9.3	103	.8	7.1	23	38	-	93
		6/14	95	12	20	9.2	103	.9	7.1	19	9	-	240
		6/17	95	13		8.8	101	2.9	7.	-	-	-	150
		6/22	130	16	7	8.8	108	.7	7.	16	6	-	23

		6/27	275	16	6	8.5	103	1.4	7.1	14	7	-	430
		6/28	285	14		9.1	105	2.4	7.	-	-	-	93
		8/10	45.6	19	7	8.1	105	2.4	7.1	24	10	.07	4,600
		8/15	49	19		7.4	96	2.2	7.2	-	-	.04	2,400
		8/18	46.3	18	1	7.9	100	.7	7.2	23	15	.09	2,100
		8/24	15.7	22	1	7.8	105	.9	7.3	26	25	.04	11,000
		9/1	21	18	0	8.6	109	.7	7.3	29	9	.04	2,400
St. Vrain Creek -Bridge on Co. Road 1½ mile west of Longmont.	SV 29.5	1/18	4	0		11.7	98	4.	7.8	-	-	.03	2,300
		1/25	4	0		10.8	89	3.	7.8	234	283	.04	2,300
		1/31	4	2		10.6	94	2.5	7.8	-	-	.01	9,300
		2/2	2	0		10.8	90	2.7	7.7	241	330	.01	730
		2/4	2	1		10.5	89	3.1	7.8	-	-	.01	430
		2/9	2	0		10.4	86	2.7	7.7	229	284	.01	150
		2/11	2	5	15	10.3	97	3.4	7.8	-	-	.02	1,500
		2/15	2	3		10.2	91	2.2	7.7	208	290	-	910
		2/17	2	6	15	10.6	101	4.1	7.6	-	-	-	2,400
		3/23	No data	14		15.8	184	2.6	8.	194	-	-	4,300
		4/1	5	5		13.3	125	1.6	8.4	198	475	.03	4,300
		4/5	4	11		9.2	101	2.8	8.3	142	517	.01	430,000
		4/8	3	8		13.5	139	2.2	8.4	-	-	.03	4,600
		4/14	5	4	5	12.4	114	2.9	8.1	166	424	.01	4,300
		4/19	3	12	20	14.4	161	5.	8.5	173	304	.06	9,300
		4/21	3	14		13.2	155	3.2	8.4	-	-	.04	2,300
		4/27	5	17		10.8	134	3.2	8.3	-	-	-	4,300
		10/28	4	8		12.7	131	3.8	8.4	-	-	.01	11,000
		11/2	4	8	10	12.	125	6.6	8.2	232	510	.01	46,000
		11/7	3.9	7	2	11.5	114	2.6	8.2	255	373	.01	9,300
		11/14	3.9	7	15	10.8	107	3.8	8.	228	483	.06	43,000
		11/17	3.8	5		11.3	108	8.	8.1	-	-	.08	4,300
		11/22	3.8	2		10.7	95	3.6	8.	-	-	-	9,300
St. Vrain Creek -Bridge on U.S. Hwy. 87, South of Longmont.	SV 27.5	8/15	3.5	20		7.8	102	4.1	7.2	-	-	.03	240,000
		8/18	3.5	17	25	8.1	100	4.6	8.	166	260	.07	43,000
		8/24	3.5	22	15	8.2	111	5.9	8.	181	294	.02	23,000
		9/1	3.5	18	15	9.2	116	2.4	8.	155	256	.01	15,000
St. Vrain Creek -bridge on Co. Road 1½ mile East of Longmont.	SV 26.	1/25	22	0		-	-	28.	7.7	338	255	.04	230,000
		1/31	20	5		8.1	77	11.	7.8	-	-	.01	150,000
		2/2	20	2		8.6	75	13.	7.7	336	347	.02	240,000
		2/4	20	4		8.2	74	9.7	7.7	-	-	.03	930,000
		2/9	20	4		8.5	79	9.8	7.7	343	375	.01	930,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
St. Vrain Creek -bridge on Co. Road 1½ mile East of Longmont (Cont.)	SV 26 (Cont.)	2/11	20	6	25	8.	79	12.	7.7	-	-	.03	930,000
		2/15	20	4		8.3	75	13.	7.7	340	339	-	430,000
		2/17	20	6	27	8.2	79	24	7.7	-	-	-	230,000
		3/23	18	10		8.2	88	22	8.	323	365	.02	930,000
		4/1	20	7		9.	89	6.6	8.1	294	359	.03	750,000
		4/5	20	11		9.2	101	5.7	8.3	189	292	.1	430,000
		4/8	21	10		7.6	81	4.1	7.9	-	-	.04	93,000
		4/14	72	6	30	8.6	83	17.	7.9	222	-	.02	1,500,000
		4/19	17	14	25	7.	81	11	8.1	288	365	.05	930,000
		4/21	17	14		7.6	88	11	8.1	-	-	.03	230,000
		4/27	39	17		6.1	76	23	7.9	-	-	-	930,000
		6/2	42	13	40	7.9	90	4.8	7.9	217	277	.06	23,000
		6/7	1833	11	140	8.2	90	2.9	7.5	58	114	-	15,000
		6/14	1621	12	90	8.6	96	2.4	7.5	48	123	-	9,300
		6/17	1374	18		7.7	98	2.	7.3	-	-	-	24,000
		6/22	961	20	10	7.7	100	3.5	7.2	36	579	-	24,000
		6/27	513	15		7.8	93	5.2	7.3	-	-	-	93,000
		8/10	16	20	20	4.	53	11.	7.8	220	570	.06	930,000
		8/15	16	20		5.8	76	11	7.9	-	-	.04	230,000
		8/18	16	17	20	5.2	64	7.1	7.9	208	428	.05	460,000
		8/24	16	20	20	5.5	73	5.4	7.8	232	485	.02	2,400,000
		9/1	16	19	20	5.8	75	3.9	7.9	230	523	.05	930,000
		10/28	16	9		8.3	87	4.7	8.4	-	-	.01	240,000
		11/2	16	9	15	9.	94	4.9	8.	274	718	.01	430,000
		11/7	15	8	5	9.4	95	4.5	8.1	290	745	.02	430,000
		11/14	15	8	6	9.7	98	3.9	8.1	287	787	.04	93,000
		11/17	15	6		10.3	100	4.3	8.1	-	-	.05	150,000
		11/22	15	4		10.	92	5.	8.	-	-	-	430,000
St. Vrain Creek -bridge on Co. Road 2½ miles East of Longmont	SV 25.	8/15	18	20		6.6	66	2.3	8.	-	-	.04	390,000
		8/18	18	15	20	6.2	74	4.4	7.9	244	446	.04	460,000
		8/24	18	20	20	6.4	85	4.2	7.9	248	474	.01	240,000
		9/1	18	15	25	7.	83	3.4	7.9	218	523	.04	240,000

St. Vrain Creek -Bridge on Hwy. 185	SV 23.	10/28	32	10		7.2	77		8.4	-	-	.01	4,600,000
		11/2	32	10	70	2.3	24	240	8.1	470	855	.08	Indeterm.
		11/7	30	10	65	1.9	20	304	8.1	507	800	.10	43,000,000
		11/14	30	8	60	3.5	36	244	8.1	153	828	-	9,300,000
		11/17	30	6		3.6	35	257	8.1	-	-	-	46,000,000
		11/22	30	5		3.4	32	262	8.1	-	-	-	110,000,000
St. Vrain Creek Boulder Creek Gage above Fourmile Creek west of Boulder, Colo.	SV 17.4 BO 28.5	6/2	244	11	8	9.6	107	.9	7.1	28	33	.1	43
		6/7	385	9	35	9.3	98	1.3	7.3	34	36	-	390
		6/14	490	12	20	9.1	103	1.2	7.2	25	13	-	230
		6/17	730	15		8.5	104	1.3	7.2	-	-	-	240
		6/22	775	15	4	8.6	104	1.4	7.2	21	11	.1	72
		6/27	634	16		8.4	103	1.4	7.2	-	-	-	39
		8/10	104	18	3	8.5	110	1.6	7.2	21	10	.08	240
		8/15	210	17		8.2	104	1.	7.2	-	-	.10	750
		8/18	121	16	0	8.	100	.5	7.2	18	10	.1	210
		8/24	100	20	1	8.1	109	.9	7.2	26	11	.02	93
		9/1	145	16	1	8.5	107	1.8	7.2	20	10	.02	240
Boulder Creek, Crossing below Fourmile Creek on Route 119, west of Boulder, Colo.	SV-BO 26.	1/18	45	0		11.8	99	4.	7.5	-	-	.02	2,300
		1/25	38	0		Not enough water			7.5	44	55	.10	230
		1/31	17	-2		11.7	98	2.5	7.5	-	-	.08	24,000
		2/2	70	0		11.7	99	1.5	7.3	34	53	.06	3,600
		2/4	70	0		11.5	97	7.4	7.3	-	-	.03	730
		2/9	29	0		11.8	100	1.2	7.1	32	62	.01	430
		2/11	96	5	1	11.4	110	1.6	7.1	-	-	.02	91
		2/15	95	0	2	11.6	97	2.2	7.1	35	68	-	230
		2/17	91	2		11.7	104	1.2	-	-	-	-	430
		3/23	11	5		10.7	103	1.3	7.7	66	-	.02	430
		4/1	56	2		11.1	97	.6	7.7	57	83	.04	390
		4/5	5	3		11.	100	1.3	8.3	64	96	.03	430
		4/8	73	6		10.2	100	1.7	7.7	-	-	.03	150
		4/14	78	2	1	11.3	101	1.2	7.7	54	155	.05	230
		4/19	102	7	30	9.9	100	1.9	7.7	55	97	.04	930
		4/21	104	9		10.2	109	1.1	7.7	-	-	.03	150
		4/28	104	10		9.8	106	2.4	7.5	-	-	-	230
		11/2	9.0	3	2	11.7	107	2.8	7.7	52	50	.05	240
		11/7	56	2	4	11.6	103	2.6	7.7	46	47	.04	1,500
		11/14	6.9	4	5	11.6	109	1.8	7.8	55	55	.08	930
		11/17	37	5		10.2	100	1.8	7.7	-	-	.10	93

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Boulder Creek -Beasley- Boulder & Left-hand Canal Intake.	SV-BO 21.	6/2	134	12	8	9.4	106	.8	7.2	31	34	-	2,300
		6/7	39	10	85	9.2	100	1.4	7.3	40	46	-	430
		6/14	60	13	15	9.2	106	1.7	7.2	27	25	-	2,400
		6/17	39	17		8.6	108	2.1	7.2	-	-	-	930
		6/22	39	15	9	8.6	104	.9	7.2	18	13		930
		6/27	110	15		8.4	102	1.2	7.2	-	-	-	230
		8/10	41	18	0	8.4	109	1.3	7.2	28	15	0.05	15,000
		8/15	83	17		8.1	102	1.8	7.	-	-	.07	9,300
		8/18	43	17	1	8.1	102	1.1	7.2	25	13	.1	15,000
		8/24	13	20	0	7.9	106	1.	7.3	28	25	.02	15,000
		9/1	39	16	1	8.8	111	.9	7.2	20	7	.04	4,600
Boulder Creek -Crossing on Hwy. 7, east of Boulder, Colo.	SV-BO 19.	1/18	50	2		6.1	53	45.	7.4	-	-	.08	Indeterm.
		1/25	20	1		8.4	73	30.	7.3	88	73	.1	2,300,000
		1/31	22	2		8.2	72	37.	7.3	-	-	.08	9,300,000
		2/2	76	2		9.2	81	20.	7.3	73	83	.08	4,300,000
		2/4	76	2		9.2	81	35	7.3	-	-	.02	2,300,000
		2/9	35	4		10.3	97	12.	7.1	52	69	.05	2,300,000
		2/11	100	5	8	10.	96	15.	7.1	-	-	.04	1,500,000
		2/15	100	2	8	8.6	76	27.	7.1	72	86	-	4,300,000
		2/17	95	5		6.9	66	64.	7.3	-	-	-	7,500,000
		3/23	16	9		6.2	66	12.	7.6	131	131	.03	9,300,000
		4/1	7	4		3.8	36	27.	7.5	122	120	.06	24,000,000
		4/5	7	7		4.5	46	26.	7.8	130	124	.04	9,300,000
		4/8	8	8		0	0	Depl.	7.5	-	-	.01	4,300,000
		4/14	7	6	25	4.7	46	15.	7.3	116	237	.06	24,000,000
		4/19	8	10	25	4.	43	18.	7.3	128	149	.06	720,000
		4/21	8	12		3.1	36	23.	7.5	-	-	.03	4,300,000
		4/27	9	10		5.2	56	29	7.5	-	-	-	7,500,000
		11/2	7.3	11	30	2.4	27	37	7.3	113	94	.07	4,300,000
		11/7	7.3	10	45	1.8	19	52	7.3	135	88	.05	46,000,000
		11/14	5.5	10	40	1.2	13	64	7.2	141	94	.1	23,000,000
		11/17	13	10		1.2	13	64	7.2	-	-	.1	24,000,000

Boulder Creek-White Rock Ditch intake	SV-BO 15.	6/2	75	13	45	9.7	112	5.	7.9	80	95	.06	Indeterm.
		6/7	0	11	75	8.7	97	2.3	7.6	55	125	-	43,000
		6/14	35	13	25	8.8	102	1.6	7.4	35	34	-	14,000
		6/17	27	16		8.1	101	3.6	7.2	-	-	-	43,000
		6/22	22	16	6	8.4	105	2.3	7.3	32	28	-	43,000
		6/27	60	16		7.9	99	1.5	7.4	-	-	-	43,000
		8/10	23	22	6	8.	110	2.1	8.	80	74	.06	240,000
		8/15	23	22		8.6	117	4.9	8.2	-	-	.03	24,000
		8/18	15	20	0	8.4	109	4.1	8.1	93	78	.05	240,000
		8/24	7	22	4	8.4	114	4	8.	83	80	.01	93,000
		9/1	3	17	10	8.2	101	3.7	7.8	-	67	.03	460,000
Boulder Creek - Crossing on Co. Road northeast of Boulder -below White Rock Ditch intake.	SV-BO 14.5	11/2	4	14	7	13.3	156	Depl.	8.2	158	138	.05	43,000
		11/7	4.5	7	4	11.9	120	4.9	8.1	160	130	.03	93,000
		11/14	3	7	3	12.6	127	5.6	8.1	188	221	.1	4,300
		11/17	3	7		12.7	129	8.2	8.1	-	-	.1	43,000
St. Vrain Creek - Boulder Creek- Coal Creek Mouth	SV-BO 6. Co-0.3	2/15	20	2		7.8	69	4.6	7.5	164	235	-	23,000
		2/17	20	5	20	7.5	72	3.6	7.5	-	-	-	12,000
		3/23	18	8		16.2	167	2.2	8.6	387	650	.02	Indeterm.
		4/1	17	4		13.9	129	2.4	8.5	296	380	.06	46,000
		4/5	32	10		12.3	129	4	8.5	201	422	.01	43,000
		4/8	43	9		7.2	75	Depl.	8.	-	-	.1	Indeterm.
		4/14	48	4	25	11.	101	8.8	8.1	185	210	.04	43,000
		4/19	48	12	25	11.3	125	3.5	8.5	230	480	.04	3,600
		4/21	23	12		12.6	141	3.3	8.7	-	-	.04	4,300
		4/27	52	15		8.5	101	13.	7.9	-	-	-	150,000
		6/2	14	14	7	11.5	134	1.2	8.3	268	365	.05	15,000
		6/7	1150	12	100	7.9	88	2.9	7.7	86	114	-	46,000
		6/14	810	14	65	8.3	97	1.8	7.6	64	47	-	240,000
		6/17	855	20		7.6	100	3.2	7.4	-	-	-	43,000
		6/22	855	16	20	7.9	96	2.3	7.4	48	674	-	43,000
		6/27	540	17		7.7	96	2.8	7.4	-	-	-	43,000
		8/10	23	22	8	10.4	142	3.6	8.4	165	266	.03	15,000
		8/15	25	20		10.7	142	4.3	8.4	-	-	.04	24,000
		8/18	16	18	15	11.1	141	2.	8.4	321	237	.1	23,000
		8/24	20	21	15	11.5	154	2.8	8.4	107	228	.01	2,300
		9/1	36	16	25	9.9	120	2.7	8.3	76	162	.02	110,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat						
St. Vrain Creek-1st Bridge above mouth of St. Vrain Creek	SV 3.6	3/11	96	1	105	9.9	83	5.2	8.	-	-	0.05	240,000
		3/16	73	4	50	9.9	91	3.	8.2	312	749	.03	23,000
		3/18	66	7	60	9.9	96	2.6	8.2	-	-	.04	2,300
		3/22	55	6	65	9.4	90	3.9	8.2	311	727	.04	15,000
		3/24	60	5	70	9.6	89	6.8	8.3	-	-	-	46,000
		3/28	58	5	50	10.5	96	3.1	8.3	292	652	.03	4,300
		4/5	76	10	45	9.9	103	4.1	8.3	304	757	.01	9,300
		4/7	71	12	50	10.4	112	3.9	8.3	-	-	-	46,000
		4/11	88	8	45	10.1	102	4.7	8.2	248	549	.02	23,000
		4/13	78	10	35	9.6	102	5.	8.3	-	-	.03	23,000
		4/15	104	8	70	9.5	96	5.2	8.2	-	-	.02	43,000
		4/19	84	14	30	9.1	104	2.8	8.4	252	523	.03	15,000
		4/21	80	12	45	9.3	102	3.7	8.3	-	-	.03	2,300
		4/25	84	16	50	8.1	96	4.4	8.3	-	-	.05	7,500
		4/27	118	12	50	9.1	101	5.2	8.2	220	480	.03	46,000
		4/29	114	16	120	7.2	86	4.5	8.2	-	-	0	23,000
		5/5	60	10	25	9.	95	1.9	8.2	270	706	0	9,300
		5/9	210	14	140	7.2	82	7.	8.	192	485	.01	93,000
		5/11	205	16	250	6.5	77	8.8	8.	-	-	.01	43,000
		5/13	545	13	650	5.	56	14.	7.8	-	-	-	43,000
		5/17	408	15	500	7.1	83	10.	7.9	130	281	-	460,000
		5/19	310	15	230	7.5	88	5.	7.9	-	-	-	43,000
		5/23	163	16	110	7.4	90	6.2	8.1	174	502	.02	23,000
		5/26	96	19	75	6.9	88	2.6	8.1	-	-	.02	2,300
		5/31	79	16	65	7.6	89	1.7	8.2	-	-	.03	24,000
Thompson River Adams Tunnel outlet	T 62.	3/25	8	7		9.5	106	.7	7.	21	36	.02	7
		3/31	10	2		9.5	92	1.5	7.1	19	17	.01	23
		4/6	7	7		9.3	104	1.	7.1	20	21	.03	43
		4/12	12	6	1	9.2	100	1	7.1	15	14	.06	23
		4/15	15	12		9.8	121	1.7	7.1	-	-	.06	23
		4/20	30	8	1	9.4	106	1.6	6.9	19	36	.07	15

		4/26	113	7		8.8	99	.9	6.9	-	-	-	9
		6/3	65	8	4	8.5	98	1.3	6.9	19	9	.09	Indeterm.
		6/8	1	10	5	8.4	99	1.4	7.1	20	9	.09	Indeterm.
		6/13	26.5	10	20	8.7	95	.7	7.	15	8	-	4
		6/16	26	12		8.5	106	1.4	7.1	-	-	-	4
		6/21	24	12	7	8.3	104	.9	7.	16	9	.05	39
		6/24	25.5	11		8.1	99	1.	7.	-	-	.06	99
		8/9	33	18	1	7.2	102	1.8	7.1	13	8	.1	150
		8/16	33	18	0	6.9	98	1.6	7.	10	8	.1	93
		8/22	25	20	1	6.9	101	5.	7.	25	2	.08	200
		8/30	10	20		7.1	109	1.5	7.	-	-	.05	9
Thompson River - above Estes Park, Colo. on Route 66.	T 56.	3/25	23	3		10.4	102	1.	7.2	24	50	.02	
		3/31	24	0		10.5	95	.4	7.1	28	22	.01	9
		4/6	20	3		10.	98	.5	7.2	26	22	.05	23
		4/12	27	8	1	9.2	102	1.2	7.1	18	14	.05	23
		4/15	39	1		10.4	96	1.	7.1	-	-	.05	23
		4/20	53	9	1	9.1	97	2.	6.9	19	36	.01	9
		4/26	161	8		9.4	106	2.2	6.9	-	-	-	23
		6/3	360	8	5	9.4	102	1.8	6.9	18	8	-	39
		6/8	765	8	4	9.3	104	1.5	6.9	18	9	-	93
		6/13	1440	10	10	9.1	104	2.1	6.9	15	8	-	93
		6/16	1017	10		8.9	104	1.2	6.9	-	-	-	75
		6/21	1245	12	10	8.7	106	1.	6.9	15	6	.08	43
		6/24	1025	11		8.5	101	1.6	6.9	-	-	-	23
		8/9	320	14	0	7.2	102	2.1	7.	17	3	.1	1,500
		8/16	163	15	0	8.	104	2.1	7.	11	3	.14	11,000
		8/22	124	15	2	7.7	100	1.9	7.	14	2	.06	930
		8/30	77	16		8.2	118	1.5	7.	-	-	.06	2,100
		9/2	65	15		8.4	109	2.	6.8	16	3	.07	4,600
		11/4	27	2	1	10.8	103	2.7	7.	24	14	.08	4
		11/10	24	2	1	11.	104	1.	7.	22	25	.06	93
		11/15	26	2	2	11.	104	.6	7.	17	17	.01	93
		11/18	25	7		10.7	115	2.4	7.1	-	-	.1	240
Thompson River - Olympus Dam outlet, below Estes Park, Colo.	T 53.8	3/25	24	3		9.6	94	.9	7.2	34	59	.04	910
		3/31	25	2		9.9	93	.9	7.2	27	24	.02	91
		4/6	26	6		7.6	79	1.5	7.3	31	24	.04	4,600
		4/12	38	10	2	8.7	101	1.3	7.1	27	23	.05	430
		4/15	33	4		9.4	93	4.3	7.1	-	-	.04	240

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Tur-bid-ity, ppm.	(7) Dissolved Oxygen		(8) 5-Day BOD ppm.	(9) pH	(10) Alka-lin-ity, ppm.	(11) Hard-ness, ppm.	(12) Cop-per, ppm.	(13) Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Thompson River - Olympus Dam outlet, below Estes Park, Colo.(Cont.)	T 53.8 (Cont.)	4/20	66	10	1	8.4	99	1.5	7.1	28	32	.06	930
		4/26	299	12		8.7	104	2.7	7.1	-	-	-	930
		6/3	336	7	8	9.8	106	1.4	6.9	20	6	-	930
		6/8	882	10	25	9.8	114	1.2	6.9	15	9	-	2,400
		6/13	1410	10	15	9.5	111	1.2	6.9	15	9	-	930
		6/16	1065	13		9.6	119	.9	6.9	-	-	-	1,500
		6/21	1280	12	9	9.4	113	1.4	6.9	15	6	.10	930
		6/24	1035	11		9.2	109	1.6	6.9	-	-	-	930
		8/9	440	16		8.4	111	1.2	7.1	28	3	.07	4,300
		8/16	190	17		7.8	105	2.3	7.	14	3	.07	3,900
		8/22	138	18	3	7.7	105	2.1	7.1	15	2	.12	2,300
		8/30	222	16		7.7	103	1.8	7.1	-	-	.04	24,000
		9/2	91	14		8.1	102	1.8	6.8	17	3	.05	4,300
		11/4	30	5	5	10.4	107	3.2	7.1	24	17	.06	43
		11/10	19	4	1	10.4	104	2.8	7.2	28	28	.03	460
		11/15	18	4	6	10.7	106	2.2	7.1	23	25	.01	430
		11/18	18	8		10.9	122	2.7	7.1	-	-	.01	290
Thompson River - Loveland Water Works intake above Handy Ditch intake.	T 32.3	2/8	18	0		11.5	96	1.9	7.3	30	120	.04	150
		2/10	18	0	2	11.4	97	1.1	7.1	-	-	.03	91
		2/14	18	0	1	11.5	97	.8	7.1	30	56	.04	73
		2/16	18	1		11.5	99	1.5	7.1	-	-	-	91
		2/18	18	4		11.7	111	1.3	7.4	-	-	-	93
		3/22	31	4		10.9	104	1.8	7.2	31	55	.1	93
		3/25	31	2		11.3	102	1.1	-	-	-	.03	9
		3/31	30	0		11.6	100	.6	7.3	29	27	.02	4
		4/6	32	6		12.5	127	1.9	7.3	28	32	.04	4
		4/12	49	8	3	9.6	101	1.5	7.2	29	24	.05	39
		4/15	129	4		10.7	104	1.2	7.1	-	-	.05	23
		4/20	144	12	0	9.3	107	2.8	7.2	28	-	.07	43
		4/26	226	10		9.2	101	2.7	7.1	-	-	-	750

Thompson River-Handy Ditch intake	T 32.3	6/3	82	9	10	9.7	101	.9	7.	26	8	-	430
		6/8	21	12	30	9.4	104	1.7	7.1	20	11	-	2,400
		6/13	194	13	25	9.4	107	1.5	7.1	16	9	-	930
		6/16	31	14		8.9	104	1.	7.	-	-	-	2,400
		6/21	21	16	10	8.6	103	1.9	7.	16	8	-	2,400
		6/24	21	14		8.5	98	1.1	7.	-	-	-	930
		8/9	86	18	2	8.3	106	Depl.	7.1	18	10	.08	1,500
		8/16	78	17	0	7.4	91	2.4	7.1	17	8	.09	930
		8/22	63	18	2	Broken		1.6	7.1	17	4	.1	2,100
		8/30	63	16		8.5	102	1.4	7.1	22	8	.02	930
		9/2	63	17		8.6	106	1.6	6.9	-	-	.08	4,600
Thompson River - Bridge on Co. road 2 miles west of Loveland, Colo.	T 26.3	1/20	1	0		10.7	88	1.1	7.7	-	-	.01	4,300
		1/24	1	-1		10.9	90	12.	7.6	219	283	.01	9,300
		1/27	1	2		10.6	92	3.2	7.8	-	-	.01	4,300
		2/1	1	0		10.4	85	2.3	7.7	197	428	.01	4,300
		2/3	1	0		10.7	88	1.8	7.8	-	-	.01	4,300
		2/8	1	0		11.3	93	1.1	7.7	202	497	.01	4,300
		2/10	1	3	6	11.1	99	1.	7.7	-	-	.01	2,300
		2/14	1	2	0	10.7	94	1.3	7.7	200	484	.03	730
		2/16	1	1		11.	94	1.2	7.7	-	-	-	4,300
		3/22	1	10		8.8	94	1.1	7.9	177	493	.01	360
		3/25	1	5		9.7	92	1.3	-	-	-	.01	Indeterm.
		3/31	11	0		10.	82	.8	8.1	175	628	.01	23
		4/6	8	10		8.7	94	1.	8.1	182	725	.04	23
		4/12	8	12	1	8.1	90	1.2	7.9	172	679	.02	23
		4/15	11	7		8.5	84	.8	7.7	-	-	.02	240
		4/20	16	13	1	8.4	96	2.6	8.1	-	-	.02	430
		4/26	1	16		7.2	88	5.2	7.9	-	-	-	230
		10/27	3	8		8.2	83	2.5	7.6	169	648	.01	2,400
		10/31	3	6	1	9.5	94	3.6	7.7	153	663	.01	230
		11/4	2.9	7		10.	99	3.	7.9	-	-	.03	93
		11/10	2.8	7	1	8.8	87	2.2	7.7	196	648	.01	430
		11/15	2.6	7	1	8.9	89	1.9	7.7	171	-	.01	930
		11/18	2.6	6		9.3	91	1.9	7.8	-	-	.05	430
		11/22	2.6	6		10.5	101	1.3	7.8	-	-	-	430
Thompson River - Loveland-Greeley Canal Inlet	T 24.3	6/3	50	13	25	7.6	86	2.4	7.3	52	38	.08	430
		6/8	265	12	50	9.	101	1.6	7.3	39	47	-	750
		6/13	27	15	40	8.7	103	2	7.3	30	38	-	2,400

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Thompson River, Loveland-Greeley Canal Inlet (Cont.)	T 24.3 (Cont.)	6/16	85	16		8.5	104	1.4	7.3	-	-	-	930
		5/21	181	17	20	8.1	101	1.2	7.2	24	38	-	930
		6/24	258	14		8.2	95	1.3	7.2	-	-	-	1,500
		8/9	114	19	1	8.	104	1.9	7.7	38	47	0.05	2,400
		8/30	14	18		8.5	105	1.5	8.	-	-	.01	930
Thompson River, Farmers Ditch Inlet	T 23.3	6/3	34	12	25	8.8	99	2.2	7.4	70	142	.06	460,000
		6/8	26	12	65	8.6	97	1.6	7.4	45	57	-	9,100
		6/13	14	15	60	8.3	99	1.9	7.3	35	57	-	15,000
		6/16	7	18		7.9	99	1.6	7.4	-	-	-	110,000
		6/21	11	18	25	7.6	96	Depl.	7.2	28	38	-	43,000
		6/24	11	18		7.6	95	Depl.	7.2	-	-	-	150,000
		6/28	32	18		8.1	102	12.	7.2	-	-	-	460,000
		8/9	25	20	1	7.5	99	Depl.	7.6	53	76	.04	2,400,000
		8/16	21.5	22	10	7.1	97	4.2	7.9	75	280	.04	2,400,000
		8/22	13.7	22	25	7.8	107	5.3	7.9	98	171	.06	750,000
		8/30	23	20		8.6	108	3.3	8.	-	-	.01	150,000
		9/2	13.5	18		8.1	103	3.4	8.	123	456	.02	23,000
Thompson River, Bridge on County Road 2½ miles east of Loveland	T 22.7	1/20	3	0		7.1	59	11.	7.5	-	-	.03	930,000
		1/24	3	0		6.7	55	4.9	7.8	199	328	.06	230,000
		1/27	3	2		7.	62	12.	7.7	-	-	.02	430,000
		2/1	2	1		6.4	54	16.	7.5	218	416	.04	11,000,000
		2/3	2	1		6.4	54	16.	7.6	-	-	.03	930,000
		2/8	2	6		6.8	64	17.	7.5	215	401	.02	430,000
		2/10	2	5	1	5.7	54	21.	7.4	-	-	.03	430,000
		2/14	3	2	8	7.	61	18.	7.5	198	357	.04	930,000
		2/16	3	2		7.	60	13.	7.5	-	-	-	930,000
		3/22	2	9		8.5	88	12.	7.8	231	425	.04	750,000
		3/25	3	6		9.9	96	8.9	-	-	-	.02	750,000
		3/31	4	3		8.9	80	11.	8.	225	444	.01	720,000
		4/6	4	12		8.3	92	9.	8.1	221	879	.03	930,000
		4/12	3	14	7	7.8	90	12.	8.	218	836	.04	930,000

		4/15	3	10		8.7	92	9.3	7.9	-	-	.01	430,000
		4/20	3	15	3	8.2	98	11.	8.1	230	438	.03	1,200,000
		4/26	3	17		10.	123	10.	8.2	-	-	-	1,500,000
		10/27	5	8		6.3	65	6.5	7.6	244	676	.01	460,000
		10/31	5	6	1	7.6	72	3.6	7.6	262	704	.03	210,000
		11/4	4.9	8		8.3	84	2.2	7.8	-	-	.03	43,000
		11/10	4.8	7	2	6.9	68	3.1	7.7	277	787	.02	93,000
		11/15	4.6	8	2	6.	61	4.	7.7	279	842	.06	240,000
		11/18	4.5	6		6.8	67	3.5	7.7	-	-	.02	93,000
		11/22	4.5	5		7.	67	3.8	7.7	-	-	-	43,000
Thompson River, Hillsboro Ditch intake	T 17.9	6/8	56	14	85	8.7	101	1.7	7.4	46	85	-	21,000
		6/13	55	16	40	8.4	100	1.9	7.5	37	57	-	9,300
		6/21	46	18	40	7.5	96	1.2	7.3	31	38	-	3,900
		6/24	85	17		7.8	96	1.4	7.3	-	-	-	9,300
		6/28	93	13		7.8	89	3.1	7.4	-	-	-	46,000
		8/9	68	21	3	7.5	101	12.	7.7	61	142	.04	110,000
		8/16	67	22	10	9.4	128	2.6	8.3	103	320	.02	43,000
		8/22	46	23	25	11.3	158	3.	8.7	132	86	.04	15,000
		8/30	67	20		9.9	130	3.	8.4	-	-	.02	43,000
		9/2	59	18		10.1	138	2.5	8.3	179	428	.02	24,000
Thompson River, Bridge on State Route 185	T 15.9	1/24	4	0		7.	58	6.8	7.6	233	237	.02	230,000
		1/27	4	2		6.8	59	7.9	7.6	-	-	.02	150,000
		2/1	4	0		5.6	47	12.	7.5	230	436	.02	240,000
		2/3	4	2		6.2	53	9.2	7.6	-	-	.03	93,000
		2/8	4	4		6.	54	16.	7.5	234	371	.02	93,000
		2/10	4	4	6	7.	65	10.	7.5	-	-	.02	43,000
		2/14	4	2	8	6.7	59	8.9	7.5	213	381	.04	930,000
		2/16	4	2		7.4	64	12.	7.6	-	-	-	230,000
		3/22	4.5	8		11.4	116	11	8.	241	474	.04	230,000
		3/25	4.5	4		12.2	112	4.8	-	-	-	.01	29,000
		3/31	4.5	2		11.5	100	10.	8.1	236	727	.01	390,000
		4/6	4	10		13	138		8.2	broken		.03	430,000
		4/12	5	13	15	11.2	128	14	8.2	227	930	.04	240,000
		4/15	5	10		10.5	110	9.8	8.	-	-	.02	460,000
		4/20	5	14	8	10.3	121	12	8.1	242	332	.03	210,000
		4/26	5	16		13.3	161	14.	8.5	-	-	-	230,000
		10/27	4.7	8		2.5	25	450.	7.4	255	718	-	2,400,000
		10/31	4.7	6		2.3	22	520.	7.5	480	622	-	2,300,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Thompson River, Bridge on State Route 185 (Cont.)	T 15.9 (Ccnt.)	11/4	4.7	9		1.	10	904	7.7	-	-	-	430,000
		11/10	4.6	8	100	0	0	520	7.8	400	538	-	230,000
		11/15	4.6	9	130	0	0	655	7.7	700	621		4,300,000
		11/18	4.6	8	-	0	0	640	7.8	-	-	-	930,000
		11/22	4.6	5	-	0	0	578	7.9	-	-	-	2,400,000
Thompson River, Bridge on State Route 259	T 9.9	1948											
		10/16	10	6		9.3	89	-	-	-	-	-	300
		10/21	11	10		1.2	13	-	-	-	-	-	>110,000
		10/26	11	9		.2	2	-	7.8	-	-	-	4,600,000
		10/29	12	9		.9	8	118	7.7	-	-	-	9,300,000
		11/10	12	4		4.3	39	515	7.7	-	-	-	2,300,000
		11/18	12	2		4.8	41	240	8.1	-	-	-	-
		11/24	12	3		4.6	40	508	7.8	-	-	-	150,000
		12/2	12	0		5.2	42	429	7.7	-	-	-	240,000
		12/9	12	0		5.7	47	406	7.9	-	-	-	1,100,000
		12/13	11	2		5.2	44	264	7.9	-	-	-	15,000
		12/17	11	0		5.2	43	259	7.8	-	-	-	93,000
		12/22	11	0		5.8	47	90	7.9	-	-	-	1,500
		12/27	10	-1		-broken -		44	7.8	-	-	-	2,300
		12/30	10	0		5.1	41	100	7.9	-	-	-	930
		1949											
		1/12	10	0		8.5	80	12	7.9	-	-	.04	930
		1/17	10	0		8.5	79	11	7.9	424	120	.03	910
		1/19	9	0		8.1	66	6.6	7.9	-	-	.03	230
		1/24	9	0		7.9	65	4.2	7.9	405	153	.05	1,500
		1/26	9	0		8.6	71	1.3	7.8	-	-	.05	2,300
		1/28	9	0		8.9	73	3.5	7.8	-	-	.03	1,500
		2/1	9	0		9.5	77	3.2	7.9	417	109	.02	230
		2/3	9	0		9.5	77	2.6	7.8	-	-	.04	4,300
		2/7	9.5	1	40	9.4	78	2.8	7.9	413	146	.03	930
		2/9	9.5	0		9.6	78	3.	7.9	-	-	.05	750

		2/11	10	1		9.6	80	3.3	7.9	-	-	.05	2,300
		2/14	10	0	55	9.4	76	5.2	3.	422	127	.04	150
		2/17	11	2		10.2	87	3.6	8.	-	-	.03	930
		2/21	11	2	55	9.1	79	>14.	8.	390	-	.04	930
		2/24	12	1	45	8.8	73	>14.	8.1	-	-	.02	2,300
		3/1	15	4	30	8.7	77	12.	8.1	385	-	.05	750
		3/3	14	4	25	9.5	86	7.5	8.1	-	-	.05	150
		3/7	13	6	20	9.1	85	8.8	8.1	407	-	.04	430
		3/9	13	3	30	9.6	85	8.6	8.1	-	-	.04	1,500
		3/11	13	1	25	8.8	74	14.	8.	-	-	.09	430
		3/16	12	3	25	9.	79	9.7	8.1	372	1087	.07	230
		3/18	12	6	40	9.5	89	6.	8.1	-	-	.07	43
		3/22	11	4	20	10.2	93	4.8	8.2	369	1112	-	93
		3/24	12	4	20	11.2	101	5.6	8.3	-	-	.04	23
		3/28	12	5	20	11.3	105	5.3	8.2	333	923	.02	150
		3/31	12	3	85	9.8	86	12.	8.1	-	-	.03	210
		4/5	12	7	35	11.1	108	4.5	8.1	328	1029	.02	43
		4/7	11	8	15	11.7	118	3.7	8.1	-	-	-	290
		4/11	11	6	15	11.9	113	3.5	8.1	277	1037	.03	93
		4/13	9.8	10	15	11.7	121	3.3	8.2	-	-	.02	23
		4/15	12	7	15	11.5	112	2.7	8.1	-	-	.03	430
		4/19	9.8	11	8	10.5	112	2.3	8.2	287	927	.03	150
		4/21	9.8	10	15	11.1	116	2.3	8.2	-	-	.02	230
		4/25	9.3	13	15	10.4	116	2.9	8.2	-	-	.04	430
		4/27	12	12	10	10.4	112	2.6	8.2	300	995	.02	750
		4/29	9.8	14	15	10.5	120	3.5	8.3	-	-	.01	930
		5/2	33	12	35	6.9	75	6.1	7.8	154	417	.02	>110,000
		5/9	18	12	5	9.1	100	2.4	8.1	307	995	.01	23,000
		5/11	9.8	14	15	8.8	102	2.	8.1	-	-	.02	4,300
		5/13	34	13	50	7.	78	4.9	8.1	-	-	.04	110,000
		5/17	11	15	10	9.3	108	1.8	8.2	354	1097	.01	23,000
		5/19	9.8	15	10	9.3	108	1.9	8.2	-	-	.04	930
		5/23	14	16	5	10.6	125	1.8	8.3	327	1046	.01	750
		5/26	21	18	20	10.	124	2.4	8.1	-	-	.01	2,400
		5/31	23	15	40	7.3	86	2.2	7.9	-	-	.04	46,000
Thompson River,	T 8.5	6/7	26	15	950	7.3	85	3.	7.6	76	159	-	93,000
Thompson Canal		6/9	19	14	350	8.	90	1.5	7.5	-	-	-	23,000
Intake		6/13	25	15	420	7.7	90	2.3	7.5	67	124	-	43,000

SUMMARY OF INDIVIDUAL RESULTS (continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Thompson River, Thompson Canal Intake (Cont.)	T 8.5 (Cont.)	6/15	23.5	14	320	8.2	94	1.5	7.5	-	-	-	15,000
		6/17	29	18	200	7.7	97	1.4	7.6	-	-	-	9,300
		6/21	37	18	170	7.8	98	2.2	7.5	48	80	-	23,000
		6/23	48	18	160	7.8	97	1.7	7.5	-	-	-	23,000
		6/28	70	19	170	7.1	90	1.9	7.7	107	353	0.02	240,000
		6/30	54	20	160	6.8	89	1.7	7.9	-	-	.01	43,000
		7/5	58	22	120	7.3	97	1.5	7.8	116	387	.01	43,000
		7/8	51	20	130	7.3	94	1.5	7.8	-	-	.01	43,000
		7/12	52	21	110	7.7	102	1.5	7.8	102	323	.03	210,000
		7/14	54	20	85	7.7	98	1.8	7.9	-	-	.02	15,000
		7/19	54	22	100	7.8	104	1.6	7.9	113	357	.02	210,000
		7/21	56	19	90	8.2	104	1.7	7.9	-	-	.02	230,000
		7/25	52	22	100	7.3	98	1.4	8.	128	408	-	-
		7/27	58	21	80	7.9	104	1.5	8.1	-	-	-	-
		7/29	38	22	90	7.8	104	1.4	8.	-	-	-	-
		8/2	48	22	110	7.9	106	1.6	8.1	148	544	.03	9,300
		8/4	53	22	140	7.7	104.	1.8	8.	-	-	.04	43,000
		8/8	48	22	120	7.2	97	2.1	8.	130	493	.01	460,000
		8/10	72	22	120	7.2	96	1.9	7.9	-	-	.01	43,000
		8/12	53	22	130	7.1	96	1.7	8.	-	-	.02	15,000
		8/16	34	22	90	8.	108	1.7	8.1	210	680	.04	23,000
		8/18	24	21	80	8.5	112	1.4	8.3	-	-	.02	4,300
		8/22	16	22	40	9.6	128	1.6	8.3	273	935	.02	2,300
		8/24	15	21	35	8.6	113	2.	8.3	-	-	.01	2,900
		8/26	15	22	65	7.7	102	2.1	8.3	-	-	.02	7,500
		8/30	20	19	40	8.8	112	1.7	8.2	278	901	.02	2,300
		9/6	16	16	40	7.9	94	1.6	8.2	287	969	.02	4,300
		9/8	17	18	35	8.8	110	1.4	8.2	-	-	.03	1,500
		9/13	15	16	45	9.4	110	1.2	8.3	290	969	.01	930
		9/15	15	16	35	9.3	112	1.1	8.3	-	-	.01	2,300
		9/19	13	16	25	9.9	119	1.5	8.2	289	986	0	2,300

		9/21	15	16	30	10.1	120	1.1	8.3	-	-	.02	4,300
		9/23	14	16	30	9.9	118	1.4	8.3	-	-	.03	3,900
		9/27	12	15	20	9.6	113	1.6	8.3	-	-	.01	4,300
Thompson River	T 6.4	1948											
Little Thompson	LT 11.	10/21	6					.8	-	-	-	-	2,300
River- bridge 1		11/12	6	5		8.2	76	2.3	8.2	-	-	-	15,000
mile east of		11/18	6	0		10.8	88	2.8	7.7	-	-	-	9,300
Larimer-Weld		12/3	6	4		10.6	96	2.	8.2	-	-	-	4,600
County line.		12/9	6	1		11.	91	1.8	8.1	-	-	-	46,000
		12/13	5	2		10.8	92	.8	8.3	-	-	-	7,500
		12/17	5	0		11.	89	1.6	8.1	-	-	-	15,000
		12/22	5	0		11	90	1.8	8.2	-	-	-	7,500
		12/27	5	0		Froze &	Broke	1.2	8.	-	-	-	43,000
		12/30	4	0		10.6	86	1.5	8.1	-	-	-	93,000
		1949											
		1/12	4	0		9.9	81	1.1	8.1	-	-	.03	93,000
		1/17	4	0		10.1	83	1.5	8.	411	124	.03	93,000
		1/19	4	0		10.2	84	1.2	8.1	-	-	.03	15,000
		1/24	4	0		10.2	84	.6	8.	399	138	.04	23,000
		1/26	4	0		10.2	84	.7	7.9	-	-	.05	9,300
		1/28	5	0		10.2	84	.9	8.1	-	-	.03	9,300
		2/1	5	0		10.2	83	.9	7.9	398	130	.02	9,300
		2/3	5	0		10.2	83	.8	7.9	-	-	.03	23,000
		2/7	4.5	1	20	10.4	86	1.5	8.1	374	109	.04	23,000
		2/9	4.5	0		10.4	84	.8	8.1	-	-	.03	43,000
		2/11	4.5	2		10.7	92	1.6	8.1	-	-	.02	9,300
		2/15	4.5	0	40	10.3	83	1.3	8.1	406	91	.03	240,000
		2/17	4.5	4		10.3	92	1.7	8.2	-	-	.03	15,000
		2/21	4.5	4	95	10.1	93	1.9	8.2	384	-	.02	23,000
		2/24	4.5	3	130	10.7	94	1.8	8.2	-	-	.01	15,000
		3/1	4.5	6	110	10.1	95	2.	8.2	382	-	.04	43,000
		3/3	4.5	7	85	10.	98	1.8	8.2	-	-	.05	23,000
		3/7	4.5	7	55	10.1	98	1.6	8.3	386	-	.03	43,000
		3/9	4.5	4	70	10.5	95	2.2	8.1	-	-	.03	93,000
		3/11	4.6	2	55	10.7	90	1.4	8.1	-	-	.04	23,000
		3/16	4.6	4	55	10.3	94	2.5	8.2	348	1656	-	23,000
		3/18	4.6	7	65	10.	98	1.5	8.2	-	-	.04	23,000
		3/22	4.6	6	55	10.	95	1.7	8.2	336	1694	.02	46,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity, ppm.	(11) Hardness, ppm.	(12) Copper, ppm.	(13) Coliforms M.P.N. per 100 ml.
Thompson River Little Thompson River - bridge 1 mile east of Larimer-Weld Co. line (Cont.)	T 6.4 LT 11.	3/24	4.7	6	65	9.9	93	1.6	8.3	-	-	-	15,000
		3/28	4.7	5	50	10.3	96	2.4	8.2	332	1493	0.03	15,000
		3/31	4.7	6	140	10.	94	2.8	8.2	-	-	.02	4,300
		4/5	1.5	10	40	9.6	102	1.8	8.2	342	1610	.01	24,000
		4/7	1.5	11	40	9.4	100	2.	8.3	-	-	-	4,300
		4/11	1.5	10	45	9.	101	2.4	8.3	329	1612	.01	24,000
		4/13	1.5	10	55	9.2	96	1.9	8.3	-	-	.02	21,000
		4/15	1.6	10	50	9.6	99	2.6	8.3	-	-	.02	4,300
		4/19	1.5	14	35	9.1	105	2.	8.3	308	1318	.02	9,300
		4/21	1.6	12	35	9.5	105	2.	8.3	-	-	.03	9,300
		4/25	1.5	13	35	9.2	103	1.8	8.4	-	-	.03	24,000
		4/27	1.6	14	35	9.6	108	2.1	8.3	-	-	0	9,300
		4/29	1.5	16	60	8.5	102	1.9	8.3	-	-	0	2,100
		5/5	1.5	10	95	8.5	89	2.3	8.2	336	1420	.02	21,000
		5/9	1.6	15	200	7.5	88	3.8	8.2	326	1573	.01	240,000
		5/11	1.5	15	95	7.7	90	1.5	8.2	-	-	.02	15,000
		5/13	1.9	13	160	7.9	88	2.9	8.1	-	-	.01	9,300
		5/17	1.6	16	110	7.6	90	1.6	8.2	294	1250	-	23,000
		5/19	1.4	16	75	7.6	90	.8	8.2	-	-	.01	9,300
		5/23	1.1	17	35	7.6	93	.5	8.3	338	1352	.01	4,300
		5/26	1.0	20	25	7.9	102	.5	8.3	-	-	0	15,000
		5/31	1.0	15	25	9.4	110	.8	8.3	-	-	.02	23,000
Little Thompson River - Minors Ditch Intake	LT 7.	6/7	0	14	1000	6.9	80	3.2	7.6	90	300	-	240,000
		6/9	0	14	500	7.7	87	1.6	7.6	-	-	-	43,000
		6/13	0	15	340	7.6	89	1.7	7.6	74	209	-	43,000
		6/15	0	16	600	6.1	73	2.8	7.9	-	-	-	23,000
		6/17	0	22	480	5.8	78	3.3	8.2	-	-	-	43,000
		6/21	0	19	230	7.4	94	1.8	7.7	75	213	-	240,000
		6/23	0	18	220	7.3	91	2.	7.7	-	-	-	43,000
		6/28	0	19	270	6.9	88	2.1	7.7	82	242	.01	240,000
		7/5	3	22	230	6.7	89	1.7	7.7	75	225	.02	93,000

		7/8	4	20	360	6.8	89	2.	7.8	-	-	.01	93,000
		7/12	4	21	360	6.9	91	1.9	7.8	82	255	.02	93,000
		7/14	5	20	350	7.1	91	1.7	7.8	-	-	.01	93,000
		7/19	4	22	310	6.7	90	2.2	7.9	91	306	.01	240,000
		7/21	4	19	320	6.9	88	2.1	7.8	-	-	.02	230,000
		7/25	3	21	500	6.5	86	2.1	7.9	88	221	-	-
		7/27	3	20	310	6.9	89	1.8	7.9	-	-	-	-
		7/29	3	22	310	6.9	91	2.2	7.9	-	-	-	-
		8/2	0	22	360	6.7	90	2.5	8.	104	391	.02	43,000
		8/4	0	22	300	6.8	91	2.2	7.9	-	-	.02	240,000
		8/8	0	22	270	6.6	89	2.4	7.9	98	221	.01	93,000
		8/10	0	22	310	6.7	90	2.4	7.9	-	-	.03	150,000
		8/12	2.5	22	400	6.7	89	2.	7.9	-	-	.02	150,000
		8/16	0	22	350	7.	93	2.2	8.	128	442	.03	150,000
		8/18	0	20	270	6.9	90	2.4	8.1	-	-	.02	93,000
		8/22	0	21	180	6.8	90	2.	8.1	143	374	.02	43,000
		8/24	0	21	240	6.5	86	2.7	8.2	-	-	.01	43,000
		8/26	1.5	22	160	6.9	92	2.2	8.2	-	-	.02	23,000
		8/30	0	19	140	7.5	95	1.6	8.2	152	510	.01	43,000
		9/6	0	18	180	7.	86	2.4	8.2	147	527	.01	93,000
		9/8	0	19	130	7.2	91	1.8	8.2	-	-	0	15,000
		9/13	0	14	180	8.2	95	1.6	8.3	164	493	.02	43,000
		9/15	0	16	160	7.6	91	2.7	8.2	-	-	.01	93,000
		9/19	4	16	110	8.1	97	2.	8.3	158	493	.02	43,000
		9/21	3	16	80	8.2	97	2.2	8.3	-	-	.01	240,000
		9/23	3	16	55	8.3	98	1.6	8.3	-	-	.01	21,000
		9/27	4	15	70	8.6	100	2.3	8.2	-	-	.01	46,000
Little Thompson River - Bridge on Co. Road 1½ mile Southwest of Johnstown, Colo.	LT 3.8	1948											
		10/16	11	6		8.	76	3.3	-	-	-	-	3,600
		10/26	11	9		8.7	89	5.	8.2	-	-	-	9,300
		10/29	11	9		8.8	90	3.3	8.1	-	-	-	2,300
		11/12	11	2		10.9	93	3.	8.2	-	-	-	110,000
		11/18	11	2		10.8	92	1.5	8.1	-	-	-	Indeterm.
		12/3	11	2		11.	94	2.4	8.3	-	-	-	4,300
		12/9	10	1		10.8	90	1.6	8.2	-	-	-	9,300
		12/13	10	0		10.7	86	2.	8.3	-	-	-	4,300
		12/17	10	0		10.8	88	1.9	8.3	-	-	-	910
		12/22	9	0		11.	89	-	8.2	-	-	-	2,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Little Thompson River-Bridge on Co. Road 1½ mile Southwest of Johnstown, Colo. (Cont.)	LT 3.8 (Cont.)	12/27	9	-1		10.3	83	1.3	8.	-	-	-	9,300
		12/30	9	-2		10.6	86	1.2	8.1	-	-	-	110,000
		1949											
		1/12	11	0		10.4	85	.8	7.9	-	-	-	15,000
		1/17	11	0		8.6	71	1.3	8.	417	124	.03	9,300
		1/19	11	0		10.6	87	.9	8.	-	-	.03	23,000
		1/24	11	0		10.7	87	.8	8.	395	124	.05	43,000
		1/26	11	0		10.4	85	.6	7.9	-	-	.05	23,000
		1/28	11	0		11.	90	1.8	8.	-	-	.03	93,000
		2/1	11	0		10.8	88	.9	7.9	398	146	.02	15,000
		2/3	12	0		10.4	85	.7	7.9	-	-	.04	150,000
		2/7	12	1	65	10.3	86	1.	7.9	389	130	.04	15,000
		2/9	12	0		10.8	88	1.1	8.	-	-	.02	15,000
		2/11	12	0		10.9	90	1.7	8.1	-	-	.02	9,300
		2/15	12	0	90	10.7	87	1.3	8.1	398	109	.03	4,300
		2/17	12	2		11.1	96	2.5	8.1	-	-	.04	43,000
		2/21	12	2	230	10.9	94	2.1	8.3	422	-	.06	93,000
		2/24	12	2	280	11.	94	2.8	8.3	-	-	.01	23,000
		3/1	12	4	220	10.4	94	3.	8.3	396	-	.04	43,000
		3/3	12	5	190	10.4	97	2.4	8.3	-	-	.04	15,000
		3/7	12	6	120	10.2	97	2.2	8.3	388	-	.04	15,000
		3/9	12	3	130	11.	97	2.	8.3	-	-	.04	9,300
		3/11	12	0	120	11.2	92	1.8	8.2	-	-	.04	23,000
		3/16	11	4	120	10.5	96	1.9	8.3	363	1895	.07	7,500
		3/18	11	6	95	10.5	99	2.8	8.3	-	-	.04	9,300
		3/22	11	6	65	10.4	98	2.	8.3	332	1777	.05	15,000
		3/24	11	4	140	10.6	96	3.7	8.4	-	-	.03	9,300
		3/28	11	4	70	10.9	100	2.4	8.3	330	1605	.03	9,300
		3/31	11	2	140	11.1	96	2.6	8.3	-	-	.03	4,300
		4/5	12	8	75	10.1	100	3.	8.3	338	1743	.03	24,000
		4/7	9.2	9	90	9.7	99	2.4	8.3	-	-	-	3,900

		4/11	9.5	6	75	10.4	100	2.6	8.3	310	1780	-	2,300
		4/13	11	10	65	9.4	98	2.5	8.3	-	-	.02	4,300
		4/15	15	7	65	10.3	100	2.1	8.3	-	-	.01	4,300
		4/19	9.5	12	35	9.2	101	2.6	8.3	305	1250	.02	24,000
		4/21	11	10	60	9.7	102	2.	8.3	-	-	.05	2,300
		4/25	7.6	14	35	9.4	106	1.5	8.4	-	-	.02	930
		4/27	8.7	12	40	10.3	112	1.3	8.4	324	1554	.01	46,000
		4/29	8.0	14	30	9.5	110	1.2	8.4	-	-	0	3,900
		5/5	8.6	10	35	9.	95	1.6	8.3	330	1471	.01	110,000
		5/9	13	13	240	9.	100	3.4	8.3	329	1539	.02	93,000
		5/11	8.3	15	75	8.9	104	1.6	8.4	-	-	.03	9,300
		5/13	12	14	170	8.2	93	2.1	8.3	-	-	.01	9,300
		5/17	12	15	160	8.8	103	2.	8.3	282	1216	-	43,000
		5/19	8.3	15	100	8.9	104	1.1	8.3	-	-	.01	4,300
		5/23	7.8	16	50	9.2	108	.9	8.3	348	1369	.03	930
		5/26	7.2	18	60	9.1	113	.7	8.2	-	-	.01	15,000
		5/31	6.4	14	5	9.2	107	.4	8.2	-	-	.01	23,000
		10/28	13	9		9.4	98	2.	8.3	-	-	.01	9,300
		11/2	13	10	35	9.5	101	2.5	8.2	272	607	.03	46,000
		11/7	13	8	45	9.7	99	1.8	8.2	266	469	.01	110,000
		11/14	12	8	30	9.9	100	2.3	8.2	366	663	.02	24,000
		11/17	12	7		10.2	101	2.	8.2	-	-	.03	43,000
Little Thompson River -bridge on County Road 1 mile east of Johnstown.	LT 2.	1948											
		10/16	22	6		11.7	111	-	-	-	-	-	>110,000
		10/26	22	10		8.2	85	16	8.2	-	-	-	150,000
		10/29	22	9		8.	82	9.4	8.2	-	-	-	230,000
		11/12	22	5		7.4	68	115.	8.4	-	-	-	430,000
		11/18	22	2		7.8	68	47	8.	-	-	-	4,600,000
		12/3	22	5		8.4	78	50	8.3	-	-	-	4,600,000
		12/9	21	6		7.3	69	138	8.4	-	-	-	430,000
		12/13	21	4		6.4	58	69	8.4	-	-	-	930,000
		12/17	21	0		7.9	65	37	8.2	-	-	-	2,400,000
		12/22	20	1		8.5	71	29	8.2	-	-	-	930,000
		12/27	20	0		6.6	54	Depl.	8.2	-	-	-	1,500,000
		12/30	20	0		8.2	67	58	8.1	-	-	-	930,000
		1949											
		1/12	20	0		7.8	64	50	8.3	-	-	.14	750,000
		1/17	20	0		7.3	60	47	8.1	402	142	.04	2,400,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Little Thompson River - bridge on County Road 1 mile east of Johnstown.	LT 2.	1/19	20	0		7.8	64	77.	8.1	-	-	0.07	930,000
		1/24	20	0		4.2	35	-	8.3	578	109	-	2,300,000
		1/26	20	0		9.2	76	22.	8.1	-	-	.06	230,000
		1/28	20	0		6.6	54	73.	8.7	-	-	.07	93,000
		2/1	20	0		9.2	75	13	8.	398	130	.02	230,000
		2/3	21	3		7.4	65	65	8.1	-	-	.05	4,600,000
		2/7	21	8	30	8.	79	18	8.1	383	109	.05	430,000
		2/9	21	4		8.3	76	38	8.1	-	-	.04	750,000
		2/11	21	6		8.6	80	48	8.	-	-	.05	430,000
		2/15	21	3	80	8.4	74	33	8.	396	109	.03	930,000
		2/17	21	5		8.4	78	44	8.3	-	-	.04	93,000
		2/21	21	6	250	8.4	80	30	8.2	413	-	.05	430,000
		2/24	22	6	260	8.7	83	20	8.3	-	-	.01	43,000
		3/1	20	8	170	7.9	78	44	8.2	388	-	.06	93,000
		3/3	20	8	150	8.2	82	53	8.3	-	-	.05	460,000
		3/7	19	10	110	6.8	72	-	8.2	382	-	.05	2,400,000
		3/9	20	8	110	6.8	67	137	8.1	-	-	.06	930,000
		3/11	19	8	85	7.5	75	34	8.1	-	-	.05	150,000
		3/16	19	8	90	7.1	71	21	8.2	343	1453	.04	430,000
		3/18	19	8	110	7.	70	43.	8.3	-	-	.05	210,000
		3/22	18	8	310	4.4	44	100.	8.7	358	1353	.03	430,000
		3/24	21	8	80	7.8	77	15	8.3	-	-	.03	430,000
		3/28	17	5	55	9.6	88	18	8.2	291	1236	.04	230,000
		3/31	17	5	85	10.3	96	6.3	8.3	-	-	.05	430,000
		4/5	18	8	45	9.7	97	7.	8.3	297	1328	.01	430,000
		4/7	13	10	60	9.3	97	5.8	8.2	-	-	-	230,000
		4/11	14	8	55	9.6	95	6.7	8.2	323	1503	.03	93,000
		4/13	16	10	100	8.1	86	25.	8.2	-	-	.05	230,000
		4/15	22	8	110	9.3	92	4.6	8.2	-	-	.04	930,000
		4/19	14	12	45	8.4	93	2.7	8.3	317	1267	.03	230,000
		4/21	16	11	60	8.8	94	3.8	8.2	-	-	.03	430,000

		4/25	11	14	45	8.1	94	5.6	8.3	-	-	.02	430,000
		4/27	12	12	55	8.9	97	5.7	8.3	320	1300	.01	230,000
		4/29	12	15	40	8.2	96	3.8	8.3	-	-	0	43,000
		5/5	11	12	35	7.5	81	7.5	8.2	298	1267	0	460,000
		5/9	18	13	85	8.5	95	3.7	8.2	312	1386	.03	930,000
		5/11	13	15	65	7.6	89	2.2	8.2	-	-	.01	430,000
		5/13	17	14	140	7.3	82	3.4	8.2	-	-	.02	290,000
		5/17	43	15	360	6.9	81	7.2	8.2	308	1131	-	230,000
		5/19	30	15	180	7.6	89	3.2	8.2	-	-	.02	75,000
		5/23	12	16	150	7.5	89	7.7	8.2	310	1148	0	93,000
		5/26	12	18	150	7.6	94	5.5	8.1	-	-	.01	460,000
		5/31	9.9	14	50	7.9	92	3.2	8.2	-	-	.03	2,400,000
		6/7	210	14	5400	7.9	89	4.5	7.6	72	215	-	23,000
		6/9	210	14	2800	7.7	87	3.2	7.5	-	-	-	240,000
		6/13	240	15	1500	7.8	91	2.9	7.6	80	209	-	93,000
		6/15	200	15	1500	7.9	92	1.8	7.5	-	-	-	150,000
		6/17	175	18	840	7.5	93	1.7	7.7	-	-	-	39,000
		6/21	145	20	600	7.	90	2.2	7.8	117	328	-	75,000
		6/23	88	20	450	6.8	88	2.6	7.8	-	-	-	460,000
		6/28	60	20	480	7.	90	2.6	8.	213	752	.01	460,000
		6/30	40	21	250	6.8	90	2.8	8.3	-	-	.01	750,000
		7/5	--	22	260	6.2	83	4.4	8.1	279	880	.02	430,000
		7/8	12	21	350	6.6	87	3.	8.2	-	-	.01	230,000
		7/12	16.5	22	500	6.9	93	2.4	8.2	278	1054	.01	150,000
		7/14	9.9	20	280	6.7	87	3.	8.3	-	-	.02	430,000
		7/19	10	22	370	6.5	87	6.7	8.2	302	1122	.02	390,000
		7/21	10.7	19	420	6.8	86	4.	8.2	-	-	.02	430,000
		7/25	8	20	450	6.1	78	6.4	8.3	312	1105	-	-
		7/27	7.2	21	190	5.6	73	3.	8.2	-	-	-	-
		7/29	9	20	200	6.9	91	2.8	8.3	-	-	-	-
		8/2	7.0	21	230	6.9	91	3.9	8.3	316	1156	.01	930,000
		8/4	6.7	22	160	6.8	90	6.9	8.2	-	-	.02	230,000
		8/8	5.7	21	240	6.6	87	4.8	8.2	290	1054	.01	230,000
		8/10	7.8	21	380	6.5	86	13.	8.2	-	-	0	230,000
		8/12	7.2	20	300	7.	90	3.2	8.2	-	-	.02	93,000
		8/16	7.0	20	230	7.1	92	4.1	8.2	322	1173	.03	430,000
		8/18	8.3	20	310	7.1	91	2.6	8.2	-	-	.02	230,000
		8/22	6.7	19	210	7.2	91	3.2	8.2	322	969	.02	930,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Little Thompson River - bridge on Co. road 1 mile east of Johnstown (Cont.)	LT 2. (Cont.)	8/24	10	19	430	5.9	87	5.7	8.2	-	-	0.02	230,000
		8/26	10.7	20	550	6.9	89	6.	8.2	-	-	.02	150,000
		8/30	10	18	260	7.2	90	4.7	8.2	332	1258	.01	430,000
		9/6	11	15	190	7.3	85	3.3	8.2	320	1241	.01	430,000
		9/8	11	18	210	7.1	88	4.1	8.2	-	-	.01	430,000
		9/13	9	14	270	8.	90	3.5	8.2	324	1224	.01	2,400,000
		9/15	10	15	290	7.7	90	3.3	8.2	-	-	.04	230,000
		9/19	8.2	16	160	7.7	91	3.1	8.1	327	1224	.03	430,000
		9/21	7.6	14	220	7.7	89	2.7	8.1	-	-	0	230,000
		9/23	6.5	14	110	7.6	88	3.	8.1	-	-	.01	430,000
		9/27	6.7	14	95	7.8	89	3.9	8.1	-	-	.02	930,000
		10/28	24	12		7.5	84	23.	8.3	-	-	.01	230,000
		11/2	24	12	25	7.6	84	32.	8.2	291	690	.07	1,500,000
		11/7	23	12	20	7.9	88	19.	8.2	277	580	.02	2,400,000
		11/14	23	12	35	7.8	87	28	8.2	407	648	.02	430,000
		11/17	23	10		8.3	88	16	8.2	-	-	.02	230,000
Thompson River - 2nd bridge above mouth on County Road east of State Route 60.	T 2.9	1948											
		10/16	20	8		10.1	100	-	-	-	-	-	4,300
		10/26	34	11		4.8	52	Depl.	7.8	-	-	-	46,000
		10/29	45	10		4.2	44	16	8.1	-	-	-	23,000
		11/10	55	6		6.5	61	445	7.9	-	-	-	460,000
		11/18	56	8		7.4	73	134	8.	-	-	-	930,000
		11/24	63	4		6.1	55	354	8.	-	-	-	430,000
		12/2	49	1		7.5	62	247	8.1	-	-	-	460,000
		12/9	43	3		6.4	56	23	8.1	-	-	-	430,000
		12/13	48	4		6.3	57	285	8.1	-	-	-	230,000
		12/17	41	0		7.8	63	73	8.1	-	-	-	430,000
		12/22	42	0		7.4	60	81	8.1	-	-	-	930,000
		12/27	40	0		Froze & Broke		81	8.	-	-	-	230,000
		12/30	39	0		9.	73	22	8.	-	-	-	430,000

		1949 1/17	34	0		9.3	75	40	7.9	396	113	.04	430,000
		1/19	32	0		9.6	78	18	8.	-	-	.04	93,000
		1/24	29	0		9.4	76	29	8.1	402	127	.07	93,000
		1/26	28	0		9.5	77	4.9	7.9	-	-	.05	93,000
		1/28	28	0		9.9	80	5.9	8.1	-	-	.04	43,000
		2/1	30	0		9.6	78	14.	8.	396	146	.03	43,000
		2/3	31	0		10.	81	8.1	7.9	-	-	.04	93,000
		2/7	33	2	15	9.2	80	10	8.	383	130	.03	240,000
		2/9	35	0		10.1	83	8.	8.1	-	-	.04	23,000
		2/11	36	2		9.7	84	5.5	8.	-	-	.02	43,000
		2/15	36	1	40	10.2	85	3.5	8.1	384	127	.04	15,000
		2/17	36	4		9.8	87	4.1	8.1	-	-	.05	43,000
		2/21	45	4	120	8.6	77	29.	8.1	386	-	.03	43,000
		2/24	43	4	120	8.9	81	8.2	8.1	-	-	.02	23,000
		3/1	46	6	95	8.4	80	15	8.1	378	-	.05	93,000
		3/3	45	8	75	8.4	83	7.5	8.1	-	-	.03	39,000
		3/7	46	8	45	7.8	79	16	8.1	371	-	.06	23,000
		3/9	48	6	60	8.4	79	12	8.1	-	-	.06	93,000
		3/11	44	6		8.3	78	9.4	8.	-	-	.06	23,000
		3/16	42	5	60	7.2	67	>28.	8.	374	1432	.07	93,000
		3/18	39	10	55	8.	82	6	8.1	-	-	.04	15,000
		3/22	27	9	65	8.6	88	2.2	8.1	324	1261	.03	9,300
		3/24	42	7	35	8.1	79	>36.	8.1	-	1	.07	39,000
		3/28	37	6	30	9.7	92	3.2	8.2	329	1445	.02	15,000
		3/31	43	5	55	10.3	96	3.6	8.2	-	-	.05	15,000
		4/5	38	11	25	10.3	110	5.1	8.3	296	1195	.03	2,800
		4/7	32	13	25	13.	145	5.	8.3	-	-	-	4,300
		4/11	16	10	15	12.3	127	3.4	8.3	286	1254	.03	4,300
		4/13	15	12	20	12.2	135	3.8	8.4	-	-	.05	4,300
		4/15	16	11	15	12.	128	3.9	8.4	-	-	.01	7,500
		4/19	12	15	10	12.8	149	3.3	8.4	272	1080	.03	7,500
		4/21	12	14	20	13.3	154	2.9	8.4	-	-	.02	46,000
		4/25	8.5	15	15	12.5	146	3.	8.4	-	-	.02	2,300
		4/27	10	14	25	13.	149	2.7	8.2	289	1233	.01	4,300
		4/29	5.2	18	20	15.7	197	3.4	8.5	-	-	.02	930
		5/5	8	10	15	9.9	103	4.2	8.2	298	1080	.01	110,000
		5/9	22	16	10	13.2	157	2.2	8.4	300	1250	.03	23,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Thompson River 2nd bridge above mouth on Co. Road east of State Route 60 (Cont.)	T 2.9 (Cont)	5/11	4	18	30	13.7	170	2.9	8.4	-	-	0.02	2,300
		5/13	16	14	15	10.4	118	2.6	8.2	-	-	.01	4,300
		5/17	24	16	5	12.3	146	1.7	8.3	317	1148	.02	9,300
		5/19	34	17	20	11.	134	2.	8.3	-	-	0	7,500
		5/23	10	18	10	13.9	173	1.5	8.4	313	1063	.01	4,300
		5/26	1	20	20	14.4	187	2.4	8.4	-	-	0	9,300
		5/31	1.3	15	10	9.6	112	1.9	8.2	-	-	.02	24,000
		6/7	3150	14	1200	6.3	73	5.8	7.5	78	168	-	43,000
		6/9	2080	16	1100	7.7	91	1.8	7.5	-	-	-	43,000
		6/13	2100	15	500	7.4	86	2.6	7.5	65	145	-	1,100,000
		6/15	2810	16	360	6.4	76	1.5	7.4	-	-	-	9,300
		6/17	1920	19	280	6.7	85	1.4	7.6	-	-	-	24,000
		6/21	1830	18	210	7.4	93	1.6	7.7	58	121	-	93,000
		6/23	1310	19	250	7.	89	1.6	7.6	-	-	-	93,000
		6/28	317	19	260	6.3	79	2.4	7.7	140	446	.03	93,000
		6/30	81	20	170	6.3	82	1.7	8.	-	-	.01	21,000
		7/5	106	22	160	6.6	89	2.1	8.	190	633	.01	43,000
		7/8	63	22	220	6.9	92	1.9	7.9	-	-	0	43,000
		7/12	144	21	260	6.9	91	1.9	7.9	164	594	.01	43,000
		7/14	113	20	190	7.2	93	1.8	8.	-	-	.03	240,000
		7/19	120	22	160	7.	93	1.7	8.1	168	571	.01	43,000
		7/21	95	19	200	7.2	91	1.6	8.	-	-	.02	93,000
		7/25	70	20	150	6.6	87	1.7	8.1	212	748	-	-
		7/27	55	21	100	7.	93	1.7	8.1	-	-	-	-
		7/29	42	20	70	7.4	97	1.3	8.1	-	-	-	-
		8/2	33	22	40	9.4	125	1.9	8.3	244	884	.01	43,000
		8/4	39	22	30	9.2	122	1.9	8.2	-	-	.01	23,000
		8/8	17	22	35	10.4	138	2.2	8.3	258	884	.02	43,000
		8/10	37	22	45	8.2	109	2.2	8.1	-	-	.01	240,000
		8/12	30	20	70	8.	104	1.8	8.2	-	-	.03	93,000
		8/16	26	20	95	7.7	101	1.8	8.1	293	1003	.03	43,000

		8/18	25	20	100	7.8	100	1.9	8.1	-	-	.02	93,000
		8/22	24	20	110	7.6	97	1.8	8.2	302	884	.05	43,000
		8/24	31	20	160	7.	89	2.8	8.2	-	-	.04	93,000
		8/26	33	20	170	7.4	96	3.	8.2	-	-	.03	150,000
		8/30	30	18	200	7.7	96	2.1	8.3	309	1156	.01	93,000
		9/6	29	16	150	7.5	88	2.	8.1	312	1122	.01	240,000
		9/8	29	18	155	7.6	95	1.5	8.2	-	-	.01	93,000
		9/13	18	14	70	9.	103	1.	8.2	310	1071	.02	93,000
		9/15	16	16	50	9.	106	1.2	8.1	-	-	.02	93,000
		9/19	18	16	25	10.2	120	1.	8.2	303	1054	0	43,000
		9/21	8.5	15	30	11.	127	1.	8.2	-	-	.02	23,000
		9/23	8.0	15	25	10.6	124	1.5	8.1	-	-	.01	460,000
		9/27	13	14	20	10.2	117	1.	8.1	-	-	.02	23,000
Cache LaPoudre River -North Poudre Canal Intake	CLP-NF 14	6/1	171	12	10	8.3	93	1.9	7.7	42	38	.15	430
		6/6	197	11	60	9.	98	2.5	7.7	36	25	-	930
		6/9	203	12		8.4	94	1.1	7.5	-	-	.15	230
		6/15	199	16	20	8.2	100	.8	7.5	39	27	-	43
		6/20	211	18	7	7.8	99	1.5	7.4	39	27	.16	75
		6/23	211	17		7.9	99	1.3	7.5	-	-	-	460
		8/11	50	18	10	8.2	107	1.8	7.8	49	36	.1	750
		8/17	99	20	15	8.2	107	1.1	7.8	54	36	.15	240
		8/23	86	18	10	8.2	104	1.5	7.9	56	40	.04	150
		8/31	106	16	4	8.2	101	1.4	7.8	60	44	.07	2,400
Cache LaPoudre River - Poudre Valley Canal Intake	CLP-49.8	6/1	15	11	9	9.4	103	2.	7.1	31	19	.15	14
		6/6	58	11	65	9.2	100	2.9	7.3	38	25	-	4,600
		6/9	32	13		8.7	99	1.5	7.3	-	-	.15	930
		6/15	32	15	15	8.8	104	2.1	7.2	28	25	-	230
		6/20	32	16	7	8.6	103	3.3	7.2	22	17	.15	43
		6/23	32	16		8.7	107	2.8	7.2	-	-	.18	150
Cache LaPoudre River - Larimer & Weld Canal Intake	CLP 41.	6/1	146	10	8	9.4	100	1.6	7.1	31	19	.15	150
		6/6	563	12	60	9.8	110	2.	7.3	36	29	-	2,400
		6/9	659	13		8.6	98	1.7	7.3	-	-	.15	930
		6/15	279	16	15	8.6	104	2.	7.2	49	25	.18	430
		6/20	129	16	8	8.4	102	2.5	7.2	30	27	.16	43
		6/23	300	16		8.5	104	2.2	7.2	-	-	.11	390
		8/11	40	21	2	8.6	116	2.2	5.4	12	38	.05	430
		8/17	27	21	3	Broken		2.9	8.2	52	48	.08	240
		8/31	21	17	0	9.	112	3.	8.	46	-	.04	2,400

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River -above Ft. Collins Power Plant on Hwy. 87	CLP 38.8	1/17	4	0		8.3	68	3.5	7.5	214	228	0.01	910
		1/20	4	0		8.9	74	1.8	7.6	-	-	.01	430
		1/26	4	0		8.1	67	1.5	7.5	-	-	.02	210
		1/27	4	2		8.4	74	1.5	7.7	-	-	<.01	930
		2/1	3.5	0		8.4	69	1.1	7.6	228	310	.01	2,100
		2/3	3.5	0		8.1	67	1.4	7.5	-	-	.04	2,400
		2/10	3.5	4	5	9.	83	1.5	7.5	240	284	.02	1,500
		2/14	3.5	0	64	8.8	72	1.8	7.5	226	272	.02	360
		2/16	3.5	5		9.5	90	3.8	7.7	-	-	-	930
		2/18	3.5	2		9.8	85	2.6	7.7	-	-	-	7,500
		3/22	3.6	2		8.9	78	2.2	7.8	222	310	.02	Indeterm.
		3/24	3.7	3		13.9	125	2.	8.2	212	304	.01	230
		3/28	4.1	3		10.	90	7.4	7.8	160	233	.03	230
		4/2	4.2	3		9.8	88	1.6	7.7	-	-	.02	91
		4/4	4.9	10		12.2	130	2.5	8.1	175	343	.10	93
		4/7	3.6	10		11.3	122	1.6	8.1	-	-	.15	240
		4/13	3.5	10	9	12.5	133	2.1	8.1	204	342	.05	93
		4/18	3.6	12	7	11.7	131	2.7	8.2	136	645	.02	240
		4/22	3.6	15		12.9	154	3.7	8.3	-	-	.04	340
		10/27	3	8		7.9	80	3.5	7.7	141	327	.01	1,600
		10/31	3	4	1	8.5	77	4.5	7.5	192	262	.03	2,400
		11/3	3	10		10.2	109	4.3	7.7	-	-	.01	430
		11/9	3	9	1	9.8	102	3.2	7.7	220	276	.01	430
		11/16	2.8	6	2	10.3	99	2.2	7.7	194	249	.06	930
		11/21	2.8	4		10.2	93	2.7	7.7	430	-	.03	430
Cache LaPoudre River - Timnath Reservoir Inlet	CLP 36.5	2/18	15	1		1.6	13	23.	7.3	-	-	-	73,000
		3/22	15	7		5.1	50	8.7	7.6	258	481	.05	430,000
		3/24	17	4		10.6	98	11.	8.1	240	371	.03	430,000
		3/28	18	4		12.1	111	10.	7.7	253	394	.01	1,500,000
		4/2	18	3		5.8	52	12.	7.6	219	452	.05	930,000
		4/5	12	15		9.	107	11.	8.2	-	-	.1	150,000

		4/7	12	14		9.3	109	7.7	8.1	-	-	.03	240,000
		4/13	10	13	15	11.8	135	14.	8.3	244	412	.05	120,000
		4/18	-12	14	5	10.3	120	9.6	8.1	227	864	.05	43,000
		4/22	10	14		14.7	171	10.	8.6	-	-	.04	93,000
		6/1	59	14	10	15.2	179	6.1	8.1	195	836	.02	910
		6/9	182	19	8	5.1	66	2.2	7.7	114	313	.05	930
		6/10	182	18		4.8	60	2.3	7.7	-	-	.05	1,500
		6/15	2	20	6	6.7	88	4.8	7.8	228	674	.05	9,300
		6/28	2	20	5	4.1	54	3.4	7.6	244	589	-	9,300
		8/19	2	18	0	3.5	43	3.2	7.8	74	437	.04	2,100
		11/3	29	12	4	1.6	18	26.	7.6	250	400	.07	230,000
		11/9	29	11	15	1.4	15	31.	7.7	280	373	.03	430,000
		11/16	7	10	20	1.6	17	43.	7.7	281	428	.05	2,400,000
		11/21	17	8		2.2	22	48.	7.7	-	-	.03	930,000
Cache LaPoudre River - Timnath Reservoir Outlet		6/1	No	15	2	9.6	114	2.8	8.	272	561	.03	930
		6/9		17	15	8.4	105	1.7	7.7	74	209	.07	430
		6/10	data	17		4.7	59	3.8	7.7	-	-	.05	750
		6/15		19	10	8.3	107	4.2	8.	253	608	.05	430
		6/20	for	22	8	9.3	128	5.6	8.2	374	627	.01	930
		6/23		21		9.	120	5.2	8.2	-	-	.03	4,300
		8/12	this	18	6	1.8	23	4.	7.5	230	370	.02	2,400
		8/23		23	6	5.7	80	7.8	7.8	169	408	.01	930
		8/31	point	22	5	7.7	104	4.4	7.9	256	474	.02	930
Cache LaPoudre River - Spring Creek	CLP 35.5	1/20	4	2		11.1	95	5.1	8.1	-	-	<.01	3,600
		1/26	4	0		11.5	95	4	8.	-	-	.01	1,500
		1/27	4	6		10.9	104	1.5	8.1	291	191	<.01	9,300
		2/1	4.3	2		11.4	99	.9	8.1	247	323	.01	2,300
		2/3	4.3	4		11.5	104	4.4	8.1	-	-	.03	9,300
		2/10	4.4	5	25	11.2	106	2.1	8.1	314	259	.01	360
		2/14	4.4	3	37	11.3	102	2.4	8.1	302	241	.03	2,300
		2/16	4.5	7		11.3	112	2.8	8.1	-	-	-	430
		2/18	4.5	4		11.4	106	2.2	8.1	-	-	-	2,300
Cache LaPoudre River -below Ft. Collins -bridge on State Route 260	CLP 35.	1/17	5	0		9.1	75	43.	7.7	-	-	<.01	15,000
		1/20	5	0		10.2	84	1.6	7.8	-	-	.01	4,300
		1/26	5	0		10.	83	3.6	7.9	-	-	.02	7,300
		1/27	5	4		10.	91	3.2	7.9	324	237	<.01	2,300
		2/1	5	1		10.6	90	7.5	7.9	322	390	.01	15,000
		2/3	5	2		10.9	95	10.5	7.9	-	-	.03	4,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River -below Ft. Collins -bridge on State Route 260 (Cont.)	CLP 35.	2/10	5	6	10	11.2	108	5.5	7.9	353	278	.01	4,300
		2/14	5	0	20	10.8	91	8.7	7.9	350	241	.01	2,300
		2/16	5	6		10.7	104	13.	8.	-	-	-	-
		2/18	5	2		9.6	84	16.	8.	-	-	-	9,300
		3/22	3.8	2		6.5	58		7.7	331	322	.1	1,500
		3/24	3.9	5		9.2	86		8.	357	304	.02	930
		3/28	5.2	5		8.	75	54.	7.9	338	399	.02	2,300
		4/2	6	3		7.3	65	126	7.7	-	-	.08	4,300
		4/4	6	10		8.4	90		7.9	334	429	.05	230
		4/7	5	12		7.5	82	155	8.1	-	-	.1	2,300
		4/13	5	10	25	8.4	91	58	8.1	320	421	.05	2,400
		4/18	4	12	25	7.7	86	36	8.1	168	565	.02	930
		4/22	5	14		9.7	114	34	8.3	-	-	.03	4,300
		10/27	3.9	10		1.9	21		7.3	473	497	-	4,600,000
		10/31	3.7	7		.5	5	1200	7.3	796	648	-	4,300,000
		11/3	3.7	14		.6	7	1410	7.2	-	-	-	Indeterm.
		11/9	3.9	13	90	.5	6	760	7.2	308	469	-	15,000,000
		11/16	2.7	12	110	.2	2	1365	7.3	836	622	-	2,300,000
		11/21	2.5	12		0	0	1350	7.2	-	-	-	110,000,000
Cache LaPoudre River - Fossil Creek Reservoir Inlet (North)	CLP 34.3	3/23	15	14		5.3	62	-	8.	243	396	.01	910
		3/28	17	4		7.	65	9.3	8.	301	845	.01	4,300
		4/1	17	6		6.1	59	27	8.3	167	812	.05	9,300
		4/4	17	12		66.6			8.1	350	1500	.03	930
		4/7	17	15		5.2	62	9.1	8.1	-	-	.01	930
		4/8	17	10		5.4	58	7.5	8.1	-	-	.01	4,300
		4/13	17	11	10	9.	98	6.1	8.3	190	-	.02	930
		4/18	17	14	6	10.2	119	4.6	8.1	100	712	.04	430
		4/19	17	15		10.7	127	4.7	8.3	-	-	.01	4,300
		4/22	17	16		13.8	167	7.	8.3	-	-	.03	210
		6/1	1	16	3	11.8	145	6.8	8.	174	247	.05	3,900
		6/9	3	18	25	5.7	71	3.6	7.6	172	256	.07	24,000

		6/10	3	15		5.8	70	2.9	7.6	-	-	.07	4,300
		6/15	3	17	7	7.7	95	2.7	7.7	182	240	.06	3,900
		6/20	3	20	3	12.1	162	3.7	8.	180	408	.05	2,400
		6/23	3	20		8.6	115	4.6	8.	-	-	.04	2,300
		8/12	2	20	3	5.1	67	1.9	7.6	120	219	.02	2,400
		8/19	3	18	1	6.3	80	2.8	7.9	102	260	.07	4,600
		8/23	2	24	1	12.	172	2.	8.4	197	352	.01	9,300
		11/3	3	12	55	1.9	21	608.	7.6	550	621	-	-
		11/9	4	11	45	1.	11	746	7.5	108	580	-	4,300,000
		11/16	3	9	60	1.7	18	828	7.7	542	565	-	4,300,000
		11/21	4	10		0	0	1016	7.2	-	-	-	46,000,000
Cache LaPoudre River - Fossil Creek Reservoir, West inlet.		3/23	2	11		12.6	137	1.4	8.4	294	270	.01	Indeterm.
		3/28	2	3		12.1	108	3.1	8.2	328	761	.01	930
		4/1	2	7		11.5	114	1.5	8.1	240	365	.03	230
		4/4	2	10		12.3	132	3.1	8.4	326	425	.05	43
		4/7	2	16		11.9	145	1.4	8.3	-	-	.02	430
		4/8	2	10		11.7	125	2.1	8.3	-	-	.03	2,400
		4/13	2	12	25	11.6	131	2.3	8.5	271	-	.02	430
		4/18	2	15	10	12.1	144	3.6	8.5	200	523	.02	2,100
		4/19	2	16		11.1	134	2.6	8.4	-	-	.02	930
		4/22	2	16		11.3	136	2.1	8.3	-	-	.02	930
Cache LaPoudre River - Fossil Creek Reservoir, Outlet on Route 185		6/15	2	17	8	2.2	27	4.2	7.8	236	270	.06	930
		6/20	2	18	6	1.5	18	7.1	7.8	286	560	.02	430
		6/28	205	19	9	2.4	30	4.7	7.7	263	551	-	750
		8/12	17	22	2	7.2	99	2.7	8.1	119	408	.02	230
		8/19	13	22	1	7.2	99	2.8	8.3	109	437	.06	91
		8/23	102	23	6	6.1	85	4.6	8.2	165	494	.01	930
		8/30	53	20		6.5	87	4.1	8.2	-	-	.03	930
		8/31	6	20	4	6.2	82	6.6	8.1	238	474	.02	240
Cache LaPoudre River - Bridge on State Route 185	CLP 32.	10/27	4.6	8		9.8	98	4.1	8.	111	897	.06	910
		10/31	4.6	4	1	10.1	95	3.8	8.	195	897	.04	2,400
		11/3	4.5	13		11.9	135	7.6	8.	-	-	.02	9,300
		11/9	4.5	8	2	11.2	115	3.2	8.	204	990	.01	430
		11/16	4.5	6	4	11.1	111	2.4	8.	183	1003	.03	430
		11/21	4.5	5		12.5	120	2.2	8.	-	-	.06	430
Cache LaPoudre River - bridge on State Route 259	CLP 21.8	1/17	10	0		8.9	72	2.	7.8	342	186	.03	930
		1/19	10	0		9.	75	1.9	7.8	-	-	.04	4,300
		1/24	10	0		7.8	63	.8	7.7	332	113	.04	4,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River - bridge on State Route 259 (Cont.)	CLP 21.8 (Cont.)	3/11	8.5	0	20	11.6	94	2.2	8.0	-	-	0.03	360
		3/16	8.5	3	25	11.8	104	2.1	8.	254	873	.03	2,300
		3/18	8.5	5	25	11.8	109	1.9	8.1	-	-	.03	4,300
		3/22	8.5	4	20	11.8	107	1.8	8.1	237	898	.06	750
		3/24	8.5	4	30	9.1	81	2.2	8.1	-	-	.07	930
		3/31	8.5	2	40	11.7	100	2.2	8.1	244	803	.05	4,600
		4/5	13	6	20	11.3	108	2.3	8.1	240	807	.01	230
		4/7	12	8	10	11.	110	1.9	8.1	-	-	-	930
		4/11	12	6	10	11.8	111	2.	8.1	242	841	.03	230
		4/13	11	10	10	11.1	116	1.8	8.3	-	-	.02	930
		4/15	14	6	10	11.2	108	1.9	8.1	-	-	.02	2,400
		4/19	14	12	10	11.9	130	2.4	8.3	227	650	.05	930
		4/21	14	10	10	12.3	130	2.5	8.3	-	-	.02	4,600
		4/25	14	13	15	12.1	135	2.8	8.3	-	-	.03	2,300
		4/27	14	12	5	13.2	144	2.2	8.3	225	757	.01	4,300
		4/29	14	14	10	10.8	124	1.9	8.3	-	-	0	9,300
		5/5	44	12	45	8.6	93	4.2	7.8	157	434	.04	24,000
		5/9	12	14	10	8.6	97	2.5	8.1	248	791	.02	23,000
		5/11	44	15	30	8.1	94	2.7	8.	-	-	.02	2,800
		5/13	31	14	30	7.4	83	2.5	7.9	-	-	.01	4,300
		5/17	11	14	20	8.	91	1.5	8.	156	400	.02	9,300
		5/19	6.8	16	5	8.6	102	.8	8.1	-	-	.01	430
		5/23	6.0	16	<5	10.7	126	.6	8.2	246	808	.01	2,300
		5/26	74	18	65	6.9	86	3.3	7.7	-	-	.02	
		5/31	115	14	70	7.3	83	4.2	7.8	-	-	.02	240,000
Cache LaPoudre River - Ford above Sugar factory at Windsor	CLP 21.3	1948											
		10/27	19	12		8.9	97	5.8	8.	-	-	-	24,000
		11/1	19			6.7	-	4.8	-	-	-	-	160,000
		11/2	19			6.	-	4.4	-	-	-	-	930,000
		11/8	19	2		6.6	57	5.	-	-	-	-	460,000
		11/15	19			7.7		3.8	7.9	-	-	-	460,000

		11/22	19	2		9.	76	2.7	7.8	-	-	-	240,000
		11/30	19	1		9.4	79	2.3	7.9	-	-	-	460,000
		12/6	12	0		8.7	71	2.8	8.1	-	-	-	23,000
		12/10	11	3		10.6	93	2.9	8.	-	-	-	9,300
		12/15	11	0		10.4	84	2.4	8.	-	-	-	46,000
		12/21	10	0		10.6	86	2.6	8.	-	-	-	24,000
		1949											
		2/1	10	0		8.9	72	1.7	7.7	326	164	.02	46,000
		2/7	9	0	15	8.3	67	3.1	7.7	327	109	.05	240,000
		2/9	9	0		8.9	72	3.	7.7	-	-	.04	240,000
		2/11	8.5	0		9.	73	2.5	7.7	-	-	.03	240,000
		2/15	8.5	0	15	8.6	69	7.	7.7	326	109	.05	23,000
		2/17	8.5	0		9.3	75	3.	7.8	-	-	.06	240,000
		2/21	8.5	0	45	10.2	84	3.2	7.9	290	-	.03	93,000
		2/24	8.5	0	30	10.6	87	3.2	8.1	-	-	.02	150,000
		3/1	9	1	25	10.9	92	3.2	7.9	268	-	.04	43,000
		3/3	9	2	25	11.1	94	2.2	8.	-	-	.04	75,000
		3/7	9	4	15	10.8	96	1.9	8.	275	-	.03	43,000
		3/9	9	1	30	11.6	97	2.3	8.1	-	-	.05	460,000
Cache LaPoudre River - Sugar factory Outlet	CLP 21.	1948											
		10/27	8	16		0	-	493	6.9	-	-	-	4,600,000
		11/8	8	-		0	-	313	-	-	-	-	9,300,000
		11/15	8			0		478	7.1	-	-	-	9,300,000
		11/22	8			0		568	7.1	-	-	-	4,300,000
		11/30	8	4		1.8	17	326	7.3	-	-	-	91,000
		12/6	8	1		0	-	170	6.7	-	-	-	930,000
		12/10	8	6		0	0		6.7	-	-	-	430,000
		1949											
		2/15	0	0	70	4.2	34	Depl.	6.9	634	109	.16	Indeterm.
		2/17	0	0		5.2	42	Depl.	7.1	-	-	.06	73
Cache LaPoudre River - bridge on State Route 257 below Windsor	CLP 20.	1948											
		10/22	20	11		0	0	-	-	-	-	-	2,400,000
		10/27	20	11		0	0	526	7.3	-	-	-	9,300,000
		11/8	12	11		0	0	208	-	-	-	-	4,300,000
		11/15	12	-		0		374	7.2	-	-	-	4,300,000
		11/22	12			0		353	7.5	-	-	-	930,000
		11/30	12	3.		2.7	23	254	7.7	-	-	-	430,000
		12/6	21	0		6.3	52	58	8.	-	-	-	93,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River - bridge on State Route 257, below Windsor (Cont.)	CLP 20. (Cont.)	12/10	20	4		6.5	59	-	7.9	-	-	-	23,000
		12/15	20	0		8.7	72	14	8.	-	-	-	43,000
		12/21	19	0		9.2	75	6.3	8.	-	-	-	240,000
		12/30	17	0		8.1	66	2.7	7.8	-	-	-	43,000
		1949											
		1/10	19	0		5.8	47	2.7	7.7	-	-	.04	93,000
		1/17	19	0		7.5	61	1.6	7.8	356	200	.03	23,000
		1/19	19	0		7.	56	2.	7.7	-	-	.04	240,000
		1/24	19	0		7.	57	1.7	7.7	354	127	.04	150,000
		1/26	19	0		7.2	58	2.4	7.6	-	-	-	240,000
		1/28	19	0		7.7	63	2.1	7.7	-	-	.03	43,000
		2/1	12	0		7.8	63	2.2	7.7	343	164	.04	93,000
		2/3	11	0		7.7	63	2.6	7.7	-	-	.03	460,000
		2/7	11	0	20	6.5	53	>7.2	7.6	340	109	.06	230,000
		2/9	10	0		6.8	55	>7.5	7.7	-	-	.04	430,000
		2/11	10	0		7.2	58	7.1	7.7	-	-	.02	430,000
		2/15	10	0	30	6.5	53	22.	7.7	342	127	.05	230,000
		2/17	10	0		7.8	63	26	7.8	-	-	.05	430,000
		2/21	10	0	20	9.3	76	16	7.8	302	-	.04	230,000
		2/24	10	0		9.1	75	37	7.9	-	-	.02	75,000
		3/1	9.5	1	20	9.9	83	13	7.9	282	-	-	23,000
		3/3	9.5	2	25	9.6	81	10	8.	-	-	.04	75,000
		3/7	9.3	4	20	8.5	76	14	7.9	292	-	.03	43,000
		3/9	9.2	1	25	9.8	81	19	7.9	-	-	.04	43,000
		3/11	8.6	0	30	8.8	71	21	8.	-	-	.04	240,000
		3/16	7.9	4	20	8.6	77	22	7.8	273	879	.06	150,000
		3/18	7.3	6	10	8.	75	11	8.	-	-	.04	240,000
		3/22	7.3	4	10	8.2	75	3.2	8.	260	880	.02	240,000
		3/24	7.3	4	20	11.5	102	7.6	8.	-	-	.05	150,000
		3/31	5.0	2	30	9.9	85	4.2	8.	262	727	.02	43,000
		4/5	12	6	15	8.7	82	2.6	8.	264	830	.02	43,000

		4/7	11	8	20	7.9	78	3.3	7.9	-	-	-	43,000
		4/11	11	4	15	9.4	84	3.2	8.	266	854	-	93,000
		4/13	11	10	20	7.9	81	2.7	8.	-	-	.01	39,000
		4/15	13	5	15	8.8	82	6.1	7.9	-	-	.02	43,000
		4/19	11	10	8	7.4	78	2.9	8.1	250	710	.02	43,000
		4/21	11	10	20	8.2	84	3.2	8.	-	-	.02	23,000
		4/25	15	13	20	6.9	77	4.	7.9	-	-	.02	15,000
		4/27	16	10	10	8.5	90	3.2	8.1	257	781	.01	9,300
		4/29	13	14	15	5.	58	3.5	7.9	-	-	0	93,000
		5/5	40	12	40	6.9	74	4.7	7.9	165	485	.01	23,000
		5/9	14	12	10	8.2	89	2.7	8.	252	757	.01	23,000
		5/11	34	15	25	7.4	87	2.9	8.1	-	-	.04	2,300
		5/13	20	14	30	6.9	80	2.9	7.9	-	-	.02	2,300
		5/17	14	14	25	7.4	83	2.2	7.9	176	417	.02	46,000
		5/19	6.7	15	15	4.6	54	2.3	7.8	-	-	.02	43,000
		5/23	5.0	14	15	3.2	37	2.4	7.8	307	808	.01	2,300
		5/26	56	18	30	6.4	80	3.1	7.8	-	-	.03	>110,000
		5/31	94	14	55	7.	80	4.3	7.8	-	-	-	43,000
Cache LaPoudre River -Greeley Ditch #3 inlet	CLP 14.4	6/7	112	14	400	7.4	85	3.7	7.5	76	125	-	93,000
		6/9	30	14	250	7.6	87	2.5	7.6	-	-	-	43,000
		6/13	5	16	140	7.9	94	1.6	7.6	67	124	-	15,000
		6/15	45	15	170	7.2	84	2.	7.4	-	-	-	9,300
		6/17	45	18	70	7.7	96	1.4	7.5	-	-	-	21,000
		6/21	45	18	65	7.8	97	1.5	7.6	65	107	-	9,300
		6/23	45	18	95	7.4	92	2.4	7.6	-	-	-	15,000
		6/28	112	20	70	7.1	92	2.	7.9	220	616	.01	21,000
		6/30	112	20	110	7.4	96	2.	7.9	-	-	.01	4,300
		7/5	112	23	60	7.8	105	1.3	8.	176	489	.02	23,000
		7/8	112	20	150	6.7	88	2.6	8.	-	-	.01	43,000
		7/12	112	22	65	7.7	104	1.8	8.1	236	748	.02	4,300
		7/14	112	22	230	7.5	100	2.3	8.2	-	-	.03	46,000
		7/19	86	23	120	8.5	116	2.	8.2	244	697	.02	2,300
		7/21	86	20	100	9.	117	1.8	8.2	-	-	.01	15,000
		7/25	52	22	50	8.9	119	1.2	8.3	264	763	-	-
		7/27	52	22	65	9.7	130	1.6	8.3	-	-	-	-
		7/29	86	22	35	9.9	131	1.4	8.3	-	-	-	-
		8/2	102	22	80	9.3	125	2.1	8.3	240	663	.02	110,000
		8/4	52	22	55	11.	149	2.1	8.3	-	-	.03	23,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen ppm.	Dissolved Oxygen % Sat.	5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
Cache LaPoudre River - Greeley Ditch #3 inlet, (Cont.)	CLP 14.4 (Cont.)	8/8	95	23	60	9.5	130	2.	8.3	232	697	0.01	23,000
		8/10	95	22	80	8.9	121	2.3	8.3	-	-	.02	15,000
		8/12	45	22	65	10.4	140	1.8	8.3	-	-	.01	9,300
		8/16	95	22	60	9.7	131	1.8	8.3	250	714	.03	7,500
		8/18	45	22	50	10.1	135	1.8	8.3	-	-	.02	4,300
		8/22	85	22	45	10.3	137	2.5	8.3	256	731	.01	7,500
		8/24	85	22	35	9.6	128	2.1	8.4	-	-	.01	4,300
		8/26	45	22	35	11.2	150	1.6	8.3	258	816	.02	2,300
		8/30	94	19	45	10.2	129	2.5	8.3	-	-	.02	9,300
		9/6	54	16	30	9.2	111	1.4	8.2	275	884	.02	15,000
		9/8	54	18	40	9.8	122	1.3	8.2	-	-	.01	43,000
		9/13	45	16	40	11.3	133	1.3	8.3	286	918	.02	4,300
		9/15	45	17	25	11.3	137	1.4	8.3	-	-	.04	23,000
		9/19	45	16	30	11.6	140	1.3	8.3	273	884	.01	1,500
		9/21	45	16	30	11.7	138	1.5	8.3	-	-	.02	110,000
		9/23	45	16	25	11.3	133	1.1	8.3	-	-	.03	9,300
		9/27	36	15	25	11.4	133	1.	8.3	-	-	.01	1,500
Cache LaPoudre River -Bridge on County road about 2 miles west of Greeley, Colo.	CLP 9.	1948											
		10/19	54			9.8		1.1	-	-	-	-	-
		10/22	22	10		2.	21	-	-	-	-	-	23,000
		10/28	10	9		-	-	110.	7.7	-	-	-	23,000
		11/9	33	7		3.	29	125	7.7	-	-	-	460,000
		11/17	35			1.3		184	7.5	-	-	-	93,000
		11/23	35	4		1.9	17	161	7.4	-	-	-	240,000
		11/30	--	2		2.8	24	138	7.8	-	-	-	43,000
		12/6	30	2		8.2	69	20	8.1	-	-	-	43,000
		12/10	23	5		9.4	87	14	8.1	-	-	-	4,300
		12/15	23	0		9.2	76	4.	8.1	-	-	-	24,000
		12/21	22	0		9.8	79	4.	8.1	-	-	-	9,300
		12/27	17	0		10.7	88	2.	7.9	-	-	-	2,300
		12/30	13	0		11.5	94	2.4	8.	-	-	-	930

		1949											
		1/10	18	0		9.1	74	1.6	7.8	-	-	.04	9,300
		1/17	11	0		10.	82	1.9	8.	360	120	.02	9,300
		1/19	11	0		10.4	84	1.8	8.	-	-	.03	7,500
		1/24	11	0		10.3	83	1.4	7.9	352	106	.05	46,000
		1/26	11	0		9.8	79	1.2	7.7	-	-	.04	9,300
		1/28	11	0		10.1	82	1.6	7.9	-	-	.03	23,000
		2/1	16	0		10.4	84	1.1	7.8	350	146	.02	43,000
		2/3	12	0		10.2	82	1.2	7.8	-	-	.04	23,000
		2/8	19	0	15	9.3	75	5.2	7.7	342	109	.03	43,000
		2/10	20	0		9.5	77	4.4	7.8	-	-	.05	43,000
		2/14	17	0	10	9.5	77	2.5	7.8	346	55	.05	7,500
		2/16	14	0		9.9	80	4.1	7.9	-	-	.03	9,300
		2/18	16	0	45	10.	82	5.4	7.9	-	-	.04	75,000
		2/23	40	1	55	9.8	82	4.5	7.9	300	-	.02	43,000
		2/25	36	2	55	9.8	84	7.8	8.	-	-	.05	2,300
		3/2	43	3	30	10.	88	4.	8.1	320	-	.05	1,500
		3/4	43	4	25	10	91	2.9	8.1	-	-	.03	430
		3/8	42	6	25	8.9	86	3.2	8.	312	-	.03	930
		3/14	35	6	30	14.6	137	3.3	8.3	280	982	.03	430
		3/17	35	6	20	14.6	139	2.8	8.3	-	-	.04	9,300
		3/21	29	10	15	15.6	161	2.2	8.4	272	983	.02	1,500
		3/23	29	10	15	14.4	152	3.1	8.3	-	-	.03	9,300
		3/25	31	6		16.6	160	3.	8.3	-	-	.02	230
		4/4	33	7	15	13.4	130	2.5	8.3	276	890	.02	430
		4/6	31	12	15	15.2	167	5.1	8.3	-	-	-	430
		4/8	29	10	20	11.9	125	2.8	8.1	-	-	.01	930
		4/12	29	13	25	13.9	153	4.	8.3	260	915	.02	930
		4/14	33	8	25	14.5	144	2.7	8.3	-	-	.02	230
		4/20	38	15	20	14.4	168	4.1	8.4	237	991	.03	150
		4/22	25	15	20	14.4	168	3.5	8.4	-	-	.02	4,600
		4/26	2.1	12	20	11.5	126	4.1	8.1	-	-	.02	91
		4/28	1.2	18	25	14.	174	3.	8.2	286	995	0	93
		5/2	1.8	18	20	13.7	170	3.6	8.2	284	1012	.01	43
		5/6	3.3	9	25	11.2	114	2.9	8.1	-	-	.01	2,400
		5/10	2.7	18	15	14.6	182	3.8	8.2	280	978	.02	930
		5/12	2.7	18	30	12.1	151	3.9	8.1	-	-	.02	9,300
		5/16	2.3	18	15	10.8	135	2.4	8.1	292	995	.02	2,300

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River -Bridge on Co. road about 2 miles west of Greeley, Colo. (Cont.)	CLP 9. (Cont.)	5/18	3.0	16	20	11.2	134	2.2	8.1	-	-	0.02	750
		5/20	2.7	16	40	9.9	118	3.	8.	-	-	-	230
		5/24	3.0	18	20	10.	126	3.	8.1	280	1063	.01	430
		5/27	3.0	20	25	8.8	113	3.1	7.9	-	-	.01	930
Cache LaPoudre River - bridge on road immediately below Greeley sewage treatment plant.	CLP 4.3	1948											
		10/19	89	-		2.6	-	65.	-	-	-	-	
		10/22	57	13		1.	12	-	-	-	-	-	11,000,000
		10/28	29	12		0	0	139.	7.5	-	-	-	43,000,000
		11/9	68	6		3.	29	96	7.7	-	-	-	23,000,000
		11/17	70	9		1.8	18	152	7.5	-	-	-	360,000
		11/23	70	5		2.5	23	160	7.5	-	-	-	1,500,000
		12/1	68	2		3.7	32	115	7.9	-	-	-	930,000
		12/10	58	4		7.2	65	30	7.8	-	-	-	2,400,000
		12/14	58	2		7.1	59	52	7.9	-	-	-	150,000
		12/17	50	2		7.7	65	41	7.7	-	-	-	930,000
		12/21	57	2		7.6	65	42	7.8	-	-	-	930,000
		12/22	53	0		8.5	69	34	7.8	-	-	-	930,000
		12/27	52	0		8.5	69	46	7.8	-	-	-	930,000
		12/29	47	0		9.1	74	39	7.8	-	-	-	4,600,000
		12/31	49	2		9.4	79	39	7.9	-	-	-	930,000
		1949											
		1/10	48	0		8.9	72	22	7.7	-	-	-	-
		1/13	51	3		9.3	82	36	7.7	-	-	.05	4,600,000
		1/18	51	0		9.8	79	32	7.8	321	157	.05	930,000
		1/20	51	0		9.8	79	43	7.7	-	-	.07	930,000
		1/25	51	0		9.6	78	46	7.7	319	116	.08	2,400,000
		1/27	51	0		9.4	76	36	7.7	-	-	.06	930,000
		1/31	51	0		9.5	78	29	7.7	-	-	.05	230,000
		2/2	46	0		9.6	79	29	7.7	318	109	.06	430,000

		2/4	42	1		9.7	81	32	7.7	-	-	.04	2,400,000
		2/8	49	3		9.9	87	40	7.7	324	130	.05	2,400,000
		2/10	50	4		10.4	93	33	7.7	-	-	.04	390,000
		2/14	47	3	50	10.	88	38	7.7	329	109	.0[illegible]	930,000
		2/16	54	4		10.5	96	41	7.9	-	-	.07	1,500,000
		2/18	56	4	40	10.6	97	32	7.8	-	-	.03	930,000
		2/23	70	4	45	9.7	89	25	7.8	292	-	.03	2,400,000
		2/25	66	6	60	10.2	97	31	7.8	-	-	.05	430,000
		3/2	68	8	30	10.6	105	26	7.9	297	-	.05	430,000
		3/4	67	8	40	10.6	105	25	8.1	-	-	.03	930,000
		3/8	66	6	30	8.8	85	24	7.8	306	-	.03	1,500,000
		3/10	68	4	40	12.4	114	28	8.	-	-	.03	2,400,000
		3/14	64	7	40	12.3	120	28	8.	281	872	.04	4,600,000
		3/17	61	8	45	13.1	129	28	8.1	-	-	.03	930,000
		3/21	60	10	50	13.7	142	33	8.2	270	870	.05	930,000
		3/23	60	12	30	13.2	143	29	8.1	-	-	.04	2,400,000
		3/25	62	8		12.9	127	23	8.1	-	-	.02	750,000
		3/29	66	6	100	12.3	117	23	8.1	250	747	.04	2,400,000
		4/4	58	7	55	11.8	115	23	8.2	323	825	.03	1,500,000
		4/6	58	12	30	13.5	147	15	8.2	-	-	-	930,000
		4/8	55	10	140	9.1	96	32	8.	-	-	.03	2,400,000
		4/12	52	13	30	13	145	9.1	8.2	268	820	.02	750,000
		4/14	58	8	95	11.6	118	22.	8.1	-	-	.03	4,600,000
		4/18	55	12	30	11.4	126	12.	8.1	265	876	.02	430,000
		4/20	55	16	40	13.	154	15	8.2	-	-	.03	930,000
		4/22	50	15	35	12.6	147	18	8.2	-	-	.06	4,600,000
		4/26	45	12	45	9.5	104	22	8.	-	-	.01	1,500,000
		4/28	54	17	40	11.5	140	19	8.2	252	791	.03	4,300,000
		5/2	40	16	60	11.	130	33	8.1	266	723	.03	9,300,000
		5/6	74	9	80	8.3	85	20	7.8	-	-	.02	2,300,000
		5/10	100	17	45	9.	109	21	7.9	265	791	.02	4,300,000
		5/12	104	17	40	9.3	113	18	8.	-	-	.01	4,300,000
		5/16	192	17	45	9.4	115	25	7.9	268	825	.02	930,000
		5/18	188	16	40	10.2	120	19	8.	-	-	.02	4,300,000
		5/20	184	16	45	9.9	119	14	8.	-	-	.02	930,000
		5/24	192	18	50	10.1	126	28	8.	266	791	.03	9,300,000
		5/27	83	19	35	10.4	132	20	8.1	-	-	.03	2,300,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. oC.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Cache LaPoudre River - Inlet to Ogilvy ditch	CLP 4.	6/6	45	16	1000	2.9	34	12	7.7	88	151	-	230,000
		6/8	45	17	350	6.1	74	3.4	7.4	-	-	-	43,000
		6/10	45	18	140	7.	87	2.4	7.5	-	-	-	93,000
		6/14	30	17	200	6.7	82	3.4	7.6	93	189	-	93,000
		6/16	30	19	130	6.8	87	2.5	7.6	-	-	-	460,000
		6/20	25	19	75	7.4	94	2.	7.7	68	114	-	43,000
		6/22	25	20	75	6.9	89	2.4	7.6	-	-	-	93,000
		6/24	25	18	140	6.	75	3.6	7.7	-	-	-	240,000
		6/29	50	20	110	5.4	70	12.	7.9	229	650	.01	4,300,000
		7/1	50	22	120	5.9	78	20.	7.9	-	-	.03	430,000
		7/7	50	21	95	5.6	74	9.8	7.8	216	680	.02	4,600,000
		7/11	75	21	100	5.6	74	11	7.8	212	663	.01	430,000
		7/13	53	22	130	5.6	74	8.5	7.8	-	-	.02	2,400,000
		7/15	53	21	100	6.5	86	7.9	7.9	-	-	.03	930,000
		7/20	53	22	100	5.	68	7.4	7.9	252	782	.01	430,000
		7/22	53	20	90	5.2	68	8.8	7.9	-	-	.02	4,600,000
		7/26	50	20	65	6.2	80	4.4	7.8	274	836	-	-
		7/28	50	20	50	6.8	89	6.9	7.9	-	-	-	-
		8/1	50	21	40	7.7	101	8.6	7.9	-	-	.02	2,400,000
		8/3	50	20	30	5.8	76	4.3	7.9	267	816	.01	1,500,000
		8/5	25	21	35	7.	92	7.2	7.9	-	-	.02	2,100,000
		8/9	40	20	65	5.	65	14.	7.8	249	816	.05	9,300,000
		8/11	40	22	55	6.2	84	8.6	7.9	-	-	.04	4,300,000
		8/15	40	21	45	6.5	86	9.	7.9	247	918	.04	24,000,000
		8/17	40	22	55	6.3	85	10.	7.9	-	-	.01	4,300,000
		8/19	40	21	45	6.8	89	8.7	7.9	-	-	.01	4,300,000
		8/23	40	22	50	6.4	86	9.5	7.8	274	867	.01	3,900,000
		8/25	30	22	50	5.6	75	12.	7.8	-	-	.03	4,300,000
		8/29	30	18	30	4.	50	6.3	7.7	252	901	.02	2,300,000
		9/2	30	19	60	5.6	70	19	7.8	-	-	.03	1,500,000
		9/7	30	18	40	5.5	69	14	7.8	260	935	.02	4,300,000

		9/12	25	16	35	3.8	50	11	7.7	282	884	.02	2,300,000
		9/14	25	16	30	7.	84	14	7.9	-	-	.03	2,300,000
		9/16	25	18	30	5.	62	9.4	7.8	-	-	.04	4,300,000
		9/20	25	17	25	5.7	70	6.2	7.7	281	867	.01	4,300,000
		9/22	25	17	30	6.	72	8.2	7.8	-	-	.02	4,300,000
		9/26	25	16	50	5.6	67	15.	7.9	-	-	.02	2,300,000
Cache LaPoudre River - 1st bridge above mouth about 1½ mile east of Greeley, Colo.	CLP 2.6	1948											
		10/19	99			2.	-	96	-	-	-	-	-
		10/22	67	15		-	-	-	-	-	-	-	11,000,000
		10/28	39	15		0	0	141	8.	-	-	-	23,000,000
		11/9	78	5		3.1	29	69	7.8	-	-	-	4,300,000
		11/17	81	10		1.4	15	192	7.5	-	-	-	4,300,000
		11/23	80	8		2.8	27	156	7.2	-	-	-	910,000
		12/1	78	2		3.7	32	81	7.8	-	-	-	230,000
		12/10	68	0		7.4	60	12	7.7	-	-	-	2,400,000
		12/14	68	0		6.6	53	53	7.8	-	-	-	930,000
		12/17	60	2		6.7	56	29	7.8	-	-	-	430,000
		12/21	67	3		7.3	64	17	7.8	-	-	-	2,400,000
		12/22	63	2		6.9	58	26	7.8	-	-	-	930,000
		12/27	62	0		8	66	38	7.8	-	-	-	1,500,000
		12/29	57	0		7.9	65	26	7.8	-	-	-	930,000
		12/31	59	1		7.7	64	28	7.9	-	-	-	750,000
		1949											
		1/10	55	0		8.8	71	15	7.7	-	-	.05	4,600,000
		1/13	58	4		8.8	78	15	7.7	-	-	.03	930,000
		1/18	58	0		8.8	71	22	7.8	324	142	.04	230,000
		1/20	58	0		9.	73	24	7.8	-	-	.05	750,000
		1/25	58	0		9.	73	30	7.7	321	124	.06	230,000
		1/27	58	0		8.1	65	21	7.7	-	-	.05	2,400,000
		1/31	58	0		9.1	75	22	7.8	-	-	.03	230,000
		2/2	53	0		8.7	71	20	7.7	325	130	.03	6,100
		2/4	49	0		8.8	72	32	7.7	-	-	.04	1,100,000
		2/8	56	2	30	8.2	70	26	7.7	320	109	.04	430,000
		2/10	58	3		8.7	76	20	7.7	-	-	.04	430,000
		2/14	55	2	30	8.7	75	21	7.7	323	127	.06	430,000
		2/16	62	4		8.4	76	17	7.8	-	-	.04	2,400,000
		2/18	64	4	50	8.7	79	22	7.8	-	-	.04	390,000
		2/23	78	4	45	8.2	75	13	7.9	300	-	.02	390,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Tur-bid-ity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alka-lin-ity, ppm.	(11) Hard-ness, ppm.	(12) Cop-per, ppm.	(13) Coliforms M.P.N. per 100 ml.
Cache LaPoudre River -1st bridge above mouth about 1½ mile east of Greeley, Colo. (Cont.)	CLP 2.6 (Cont.)	2/25	74	6	55	8.1	76	19	7.8	-	-	0.05	930,000
		3/2	73	8	33	8.2	81	14	7.9	306	-	.05	93,000
		3/4	72	7	40	7.9	77	16	7.9	-	-	.04	1,500,000
		3/8	71	6	25	7.1	69	12.	7.8	305	-	.04	230,000
		3/10	70	5	35	9.5	88	15	7.9	-	-	.03	930,000
		3/14	66	7	25	9.3	90	10	7.9	290	879	.03	430,000
		3/17	64	7	25	9.8	95	12	7.9	-	-	.04	93,000
		3/21	62	9	40	9.4	96	17	8.	282	868	.04	430,000
		3/23	64	10	20	9.6	102	13	8.	-	-	.04	390,000
		3/25	65	8		9.9	97	12	8.	-	-	.02	430,000
		3/29	70	6	50	9.7	91	13	7.9	252	758	.05	1,500,000
		4/4	66	6	20	11.	105	6.2	8.	284	843	.02	230,000
		4/6	63	12	20	10.8	116	5.8	8.1	-	-	-	930,000
		4/8	63	10	20	8.3	86	5.	7.9	-	-	.03	750,000
		4/12	60	13	20	9.9	111	5.5	8.	272	834	.03	430,000
		4/14	70	8	50	10.4	105	10	8.	-	-	.03	1,500,000
		4/18	63	12	25	10.1	110	5.7	8.1	273	752	.02	230,000
		4/20	60	14	25	10.9	126	7.8	8.1	-	-	.03	430,000
		4/22	57	15	25	10.8	126	7.9	8.2	-	-	.02	150,000
		4/26	53	12	20	8.4	92	7.8	7.9	-	-	.03	2,600,000
		4/28	62	17	20	9.1	111	14	8.1	260	791	.01	430,000
		5/2	30	16	15	9.4	111	6.2	8.	275	757	0	930,000
		5/6	41	8	220	9.	91	8.9	7.8	-	-	.02	430,000
		5/10	36	17	75	8.2	100	2.9	8.3	254	791	.01	3,600
		5/12	29	16	100	8.2	97	4.2	8.2	-	-	.01	2,300
		5/16	60	17	45	6.8	83	6.4	7.9	275	859	.03	460,000
		5/18	57	16	30	6.9	82	4.	7.9	-	-	.03	460,000
		5/20	51	16	25	6.4	77	3.9	7.9	-	-	.02	430,000
		5/24	33	18	35	7.7	95	7.9	8.	276	859	0	230,000
		5/27	15	19	20	11.7	148	6.5	7.9	-	-	.01	23,000
		6/6	1300	16	1300	1.7	20	14	7.7	92	155	-	230,000

		6/8	2040	17	450	6.2	75	3.6	7.5	-	-	-	240,000
		6/10	1430	18	180	6.7	83	2.4	7.5	-	-	-	240,000
		6/14	1810	18	220	6.4	80	3.1	7.6	83	158	-	93,000
		6/16	2510	20	130	6.4	82	2.4	7.6	-	-	-	93,000
		6/20	2300	20	85	7.	90	2.1	7.7	68	120	-	75,000
		6/22	1480	20	80	6.7	88	2.	7.6	-	-	-	93,000
		6/24	663	18	140	5.9	74	3.5	7.7	-	-	-	240,000
		6/29	98	21	85	5.8	76	7.	7.8	232	650	.01	430,000
		7/1	85	22	130	6.3	85	16.	7.9	-	-	.03	430,000
		7/7	54	21	80	8.	105	3.8	7.8	236	680	.02	750,000
		7/11	82	22	120	6.3	84	4	7.9	219	714	.02	150,000
		7/13	93	22	150	6.2	84	4	7.8	-	-	.04	430,000
		7/15	92	21	180	6.3	83	3.2	8.	-	-	.02	430,000
		7/20	42	24	70	6.2	86	1.9	7.9	276	782	.02	430,000
		7/22	37	21	100	7.	93	2.1	7.8	-	-	.02	230,000
		7/26	22	20	40	7.3	95	2.5	7.8	275	731	-	-
		7/28	19	20	30	7.2	94	2.3	7.7	-	-	-	-
		8/1	4.0	21	30	8.4	111	2.	7.8	-	-	.02	430,000
		8/3	5.5	21	40	8.8	116	2.	8.	285	782	.06	93,000
		8/5	6.5	21	25	8.7	115	2.	7.8	-	-	.02	150,000
		8/9	24	20	25	7.7	99	1.9	7.8	296	850	.01	750,000
		8/11	18	22	20	9.	120	1.9	8.	-	-	.01	430,000
		8/15	17	21	30	9.3	122	1.5	7.9	289	833	.04	230,000
		8/17	22	22	25	9.2	123	1.7	7.9	-	-	.05	430,000
		8/19	19	20	25	9.5	124	1.4	8.2	-	-	.01	230,000
		8/23	13	21	15	9.8	129	1.8	7.9	296	799	.04	2,400,000
		8/25	19	22	25	9.5	126	2.	8.	-	-	.03	230,000
		8/29	18	18	25	7.1	88	1.5	7.7	296	833	.02	43,000
		9/2	33	18	55	7.6	96	2	7.9	-	-	.02	230,000
		9/7	38	18	35	7.3	91	1.4	8.	278	799	.02	43,000
		9/12	24	15	35	7.7	90	1.1	8.	293	867	.03	43,000
		9/14	23	16	25	8.4	101	1.1	8.	-	-	.02	430,000
		9/16	21	18	20	8.2	102	1.2	7.9	-	-	.02	43,000
		9/20	27	17	25	8.8	107	1.2	8.	281	850	.01	23,000
		9/22	36	17	20	8.6	105	1.2	8.1	-	-	.02	1,100,000
		9/26	20	16	10	8.2	97	1.	7.9	-	-	.02	39,000

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp. °C.	Tur-bid-ity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alka-lin-ity, ppm.	Hard-ness, ppm.	Cop-per, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Crow Creek - Crossing at Ft. Warren above Cheyenne, Wyo.	Cr 81.6	3/21	2.	6		10.1	102	1.6	8.	-	-	0.1	91
		3/24	2.	0		10.5	90	3.1	8.1	221	243	.03	150
		4/4	No	2		11.6	105	1.7	8.1	222	210	.05	9
		4/7	data	6		10.3	104	1.1	8.1	-	-	.06	7
		4/13	for	6	6	10.3	104	2.8	8.1	212	201	.02	15
		4/18	this	8	7	10.9	114	3.4	8.3	151	198	.06	93
		4/22	period	10		10.6	116	3.2	8.3	-	-	.02	39
Crow Creek - Crossing at Hwy. 85-87, Cheyenne, Wyo.	Cr 77.	3/21	3.	12		5.5	64	3.6	8.1	-	-	.08	15,000
		3/24	3.	2		10.4	94	5.3	8.	205	250	.07	9,300
		4/4	2.7	5		11.8	116	3.8	8.1	229	213	.07	23,000
		4/7	2.7	5		11.2	110	1.7	8.3	-	-	.03	1,500
		4/13	2.7	6	30	7.4	74	4.1	8.3	216	208	[illegible]	24,000
		4/18	2.7	10	6	13.3	145	3	8.5	224	243	.05	7,500
		4/22	2.7	10		14.7	163	3	8.7	-	-	.03	7,500
		11/3	2.	4	110	9.4	91	Depl.	7.9	272	235	.04	43,000
		11/9	1.8	7	60	9.	93	4.5	7.9	273	235	.04	9,300
		11/16	3.	7	25	9.6	99	3.5	7.9	269	235	.1	9,300
		11/21	2.5	2		10.7	97	2.3	8.	-	-	.08	6,000
Crow Creek - Storm Sewer Outlet, Cheyenne, Wyo.	Cr 76.3	8/17	No data	24	30	4.9	73	22	7.6	98	105	.06	46,000
		8/23		21	25	4.4	61	30	7.7	108	86	.1	3,900
		8/31		18	10	5.4	72	9.4	7.6	84	86	.08	15,000
Crow Creek - below outlet of Refinery	Cr 76.	8/17	6	21	25	Depl.	-	51	8.7	268	152	.25	4,300,000
		8/23	6	22	25	Depl.	-	54	8.6	228	171	.1	2,400,000
		8/31	6	16	30	Depl.	-	66	8.6	210	152	.2	4,300,000
		11/3	6	10	25	Broken		36	8.2	266	221	.07	430,000
		11/9	6	11	30	.3	3	78	8.4	291	235	.1	11,000,000
		11/16	6	8	30	1.8	20	47	8.3	267	235	-	4,300,000
		11/21	6	8		.0	0	51	8.6	-	-	-	930,000
Crow Creek - Crossing on road below Sewage Lagoons at Hereford Ranch.	Cr 72.5	3/21	15	7		9.6	79	Depl.	7.7	-	-	.1	930,000
		3/24	15	4		7.1	68	21	7.7	256	237	.1	230,000
		4/4	1.5	6		6.8	68	9.6	7.7	242	203	.04	3,600
		4/7	1.5	8		6.5	69	8.4	7.7	-	-	.07	24,000

		4/13	1.5	8	20	12.2	128	9.9	7.9	245	208	.06	11,000
		4/18	1.5	10	30	9.1	101	12	8.3	226	228	.08	9,300
		4/22	33	11		10.9	124	14	8.7	-	-	.07	15,000
		6/1	15	16	25	5.9	75	12	7.8	250	238	.15	46,000
		6/6	28	15	35	6.8	84	10	7.8	244	228	.1	9,300
		6/9	117	16		3.4	42	6.2	7.7	-	-	.15	24,000
		6/15	87	18	20	3.8	50	6.1	7.7	200	171	.15	9,000
		6/20	47	19	6	4.3	58	7.9	7.8	207	171	.1	9,300
		6/23	57	20		4.4	60	7.2	7.9	-	-	.08	4,300
		8/11	5	21	35	5.2	72	Depl.	7.9	256	228	.13	150,000
		8/17	5.4	20	20	4.6	64	10	7.8	268	152	.2	460,000
		8/23	0.5	19	30	2.6	36	20	7.3	329	190	.08	430,000
		11/3	9.5	6	55	7.8	79	20	8.	282	249	.07	430,000
		11/9	75	6	50	7.1	71	20	7.9	294	235	.06	23,000
		11/16	75	5	85	3.1	28	30	7.7	324	235	-	2,400,000
		11/21	5.6	4		3.	28	41	7.7	-	-	-	4,600,000
Lodgepole Creek Inlet to Oliver Reservoir at Bushnell, Nebr.	Lod 112.8	5/11	14	14	4	8.2	92	4.5	8.1	215	380	.08	36
		5/16	42	12	400	6.8	73	11	7.7	173	171	.1	15,000
		5/19	20	15	25	7.5	86	5.2	8.	223	199	.05	430
		5/24	14	18	15	8.4	103	4.3	8.1	227	171	.04	93
		7/11	12	18	2	7.8	97	3.6	8.	208	171	.06	460
		7/13	11	18		7.7	94	3.5	8.2	-	-	.04	4,600
		7/20	9	20	4	7.6	96	3.1	8.3	204	162	.03	750
		7/22	9	17		8.6	103	2.2	8.	-	-	.05	2,400
		7/26	9	17	1	8.4	100	1.8	8.	212	171	.03	1,500
		7/28	9	17		8.6	103	2.5	8.2	-	-	.06	1,500
		8/2	10	17	20	7.9	94	3.1	8.	182	190	.02	2,400
		9/27	9	10	15	8.7	92	3.4	8.2	227	162	.02	24,000
		9/29	9	10		8.5	92	3.5	8.2	-	-	.08	9,300
		10/4	10	10	20	9.5	102	2.7	8.	215	143	.01	1,500
		10/6	10	12		8.5	94	3.5	8.	-	-	.04	4,300
Lodgepole Creek-Outlet of Oliver Reservoir	Lod 111.2	5/11	0.4	14	6	9.2	104	1.5	8.4	198	289	.08	Indeterm.
		5/16	0.5	10	10	8.8	91	4.	8.4	180	171	.05	230
		5/19	0.6	16	15	8.4	97	4.9	8.4	188	180	.06	93
		5/24	0.8	17	8	8.4	98	5.1	8.3	178	152	.07	93
		7/11	30	22	1	2.2	30	4.6	7.9	166	133	.05	2,400
		7/13	24	20		3.4	43	3.2	8.	-	-	.05	460
		7/20	34	22	2	3.5	46	5.2	8.2	154	114	.04	4,600

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1)	(2)	(3)	(4)	(5)	(6)	(7)		(8)	(9)	(10)	(11)	(12)	(13)
Sampling Point	Mileage from Mouth	Date	Stream Flow c.f.s.	Water Temp °C.	Turbidity, ppm.	Dissolved Oxygen		5-Day BOD ppm.	pH	Alkalinity, ppm.	Hardness, ppm.	Copper, ppm.	Coliforms M.P.N. per 100 ml.
						ppm.	% Sat.						
Lodgepole Creek-Outlet of Oliver Reservoir (Cont.)	Lod 111.2	7/22	37	20		4.1	51	3.1	7.9	-	-	0.06	2,400
		7/26	28	20	6	4.4	56	3.	8.	157	114	.04	930
		7/28	24	20		4.3	54	3.3	8.2	-	-	.06	24,000
Lodgepole Creek - Bennett Reservoir Inlet	Lod 101.	5/19	10	17	15	7.9	95	3.3	8.6	176	180	.05	91
		5/24	8.3	18	10	8.3	99	6.2	8.7	178	161	.06	39
		7/11	11	20	5	8.5	107	2.5	8.2	206	171	.06	46,000
		7/13	10	20		7.6	97	2.3	8.2	-	-	.05	9,300
		7/20	10	20	5	8.	102	2.7	8.4	210	162	.05	110,000
		7/22	8	17		9.2	109	1.9	8.2	-	-	.01	43,000
		7/26	7	18	2	8.9	110	3.2	8.2	230	162	.03	15,000
		7/28	0.1	17		2.	24	>7.5	8.	-	-	.07	23,000
		8/2	0.6	20	10	5.8	73	3.5	8.2	214	199	.06	24,000
		9/27	0.3	10	9	6.8	91	5.4	8.	249	152	.02	93,000
		9/29	0.2	12		7.4	78	5.2	8.2	-	-	.01	93,000
		10/4	4.5	12	9	7.5	82	6.5	8.	234	162	.01	43,000
		10/6	4.7	13		7.4	83	4.8	8.	-	-	.03	93,000
Lodgepole Creek-Bennett Reservoir Outlet	Lod 100.3	7/11	No data for this point	23	4	6.3	84	3.4	9.2	139	133	.04	43
		7/13		22		8.3	110	4.3	9.2	-	-	.04	150
		7/20		23	4	8.8	118	5.4	9.2	133	76	.04	93
		7/22		20		9.1	115	6	9.2	-	-	.02	460
		7/26		22	10	9.2	120	9.	9.4	124	95	.04	43
		7/28		20		8.9	114	9.6	9.2	-	-	.01	120
Lodgepole Creek-Below sewage disposal plant, Sidney, Nebraska	Lod 55.7	5/11	1.5	20	25	8.7	108	Depl.	8.1	296	350	.1	430,000
		5/16	3.0	12	1500	Indeterm.		10.	7.9	181	532	.1	93,000
		5/19	3.5	17	30	4.9	57	10	7.9	251	171	.06	930,000
		5/24	800	22	25	9.5	123	6.4	8.3	222	180	.05	15,000
		7/11	3.0	23	3	8.7	114	2.2	8.2	188	133	.05	240,000
		7/13	3.0	28		9.3	131	6.4	8.3	-	-	.05	93,000
		7/20	2.5	24	2	11.6	154	6.4	8.4	205	171	.04	24,000
		7/22	2.8	22		12.3	157	5.1	8.4	-	-	.02	93,000
		7/26	2.5	21	2	12.5	157	6.4	8.4	212	152	.05	93,000

		7/28	2.5	20		11.3	139	8.3	8.2	-	-	.01	39,000
		8/2	3.0	22	20	10.8	139	8.5	8.4	203	218	.05	460,000
		9/27	2.6	13	6	7.6	83	11.	7.9	286	162	.02	93,000
		9/29	1.9	16		9.2	106	10.	8.1	-	-	.09	240,000
		10/4	2.3	16	6	11.3	131	7.1	8.1	261	143	.04	930,000
		10/6	2.3	16		6.4	76	Depl.	7.7	-	-	.06	Indeterm.
		10/10	4.1	10	45	6.1	62	Depl.	7.7	152	104	.1	930,000
		10/12	1.1	9		4.8	48	17.	7.5	-	-	.08	430,000
		10/14	1.1	12	5	5.3	58	10	7.9	260	143	.1	230,000
		10/17	2.0	11	8	6.4	67	10	7.7	263	143	.06	230,000
		10/18	1.3	12		5.2	56	8.5	7.7	-	-	.05	43,000
		11/30	2.5	4	6	5.6	50	13	7.7	278	234	.09	240,000
		12/2	2.6	4		5.4	49	6.2	7.7	-	-	.06	460,000
		12/5	3.0	3	8	6.2	53	7.6	7.7	271	207	.07	93,000
		12/7	2.4	5		6.1	55	7.8	7.7	-	-	.05	390,000
		12/8	2.8	3	1	5.7	49	6.6	7.7	262	234	.07	75,000
		12/13	2.8	5	10	Broken	-	11.	7.7	273	221	.1	2,400,000
		12/15	2.8	2		5.8	49	9.2	7.7	-	-	.05	1,500,000
Lodgepole Creek- Below Lodgepole, Nebr. bridge on Co. road south of town.	Lod 26.8	5/11	12	17		8.2	96	3.9	8.1	304	350	.1	230
		5/16	20	15	100	7.7	86	6.2	8.1	286	238	.09	11,000
		5/19	38	16	95	6.	69	4.8	7.8	226	142	.1	3,900
		5/24	275	21	130	7.3	92	7.4	8.1	306	218	.06	4,600
Lodgepole Creek- Crossing south of Chappell, Nebr.	Lod 12.	5/11	15	18	15	7.1	85	3.2	8.2	338	380	.1	430
		5/16	15	18		6.4	76	2.6	8.1	-	-	.07	930
		5/19	19	17	20	7.5	87	3.7	8.	304	199	.1	2,400
		5/24	225	20	80	6.	74	2.4	8.1	300	218	.06	930
		7/11	8	25	75	7.1	96	5.1	8.3	271	190	.05	24,000
		7/13	8	21		7.5	94	5.5	8.4	-	-	.03	11,000
		7/20	19	26	40	6.7	91	6.8	8.4	270	199	.04	2,400
		7/22	17	24		6.9	92	5.4	8.3	-	-	.06	11,000
		7/26	15	24	10	7.1	96	6.9	8.2	259	199	.09	11,000
		7/28	14	24		7.5	100	7.1	8.3	-	-	.08	9,300
		8/2	14	25	110	7.5	101	6.8	8.3	213	181	.03	24,000
		9/27	12	16	20	9.6	108	7.2	8.4	212	133	.01	4,300
		9/29	12	16		7	79	6.6	8.4	-	-	.02	2,300
		10/4	12	16	20	9.5	108	5.8	8.4	208	143	.01	930
		10/6	12	17		9.	105	5.8	7.7	-	-	.02	2,300
		11/30	10	4	15	13.3	115	1.6	8.3	198	234	.02	360

SUMMARY OF INDIVIDUAL RESULTS (Continued)

(1) Sampling Point	(2) Mileage from Mouth	(3) Date	(4) Stream Flow c.f.s.	(5) Water Temp. °C.	(6) Turbidity, ppm.	(7) Dissolved Oxygen ppm.	(7) Dissolved Oxygen % Sat.	(8) 5-Day BOD ppm.	(9) pH	(10) Alkalinity, ppm.	(11) Hardness, ppm.	(12) Copper, ppm.	(13) Coliforms M.P.N. per 100 ml.
Lodgepole Creek-Crossing south of Chappell, Nebr. (Cont.)	Lod 12. (Cont.)	12/2	11	4		13.4	117	1.6	8.3	-	-	0.02	91
		12/5	13	2	20	13.1	107	2.2	8.2	251	234	.01	390
		12/7	12	2		13.2	106	1.6	8.3	-	-	.03	93
		12/8	22	0	10	13.	101	2	8.2	294	234	.01	430
		12/15	20	1		11.7	93	2.5	8.	-	-	.03	150
Lodgepole Creek-Crossing at Ovid, Colorado, Hwy. 138	Lod 0.5	5/10	6	16	55	9	101	2.8	8.3	259	532	.06	2,000
		5/13	9	16		8.6	99	1.5	8.3	-	-	.03	9,300
		5/18	24	16	60	8.6	98	5.5	8.3	196	513	.04	4,300
		5/25	31	16		7.7	88	3.5	8.3	-	-	.05	930
		7/11	10	26	55	8	110	5.6	8.4	217	181	.06	2,400
		7/13	12	27		7.7	107	5.8	8.4	-	-	.04	2,400
		7/20	16	28	35	6.8	96	5.3	8.4	202	437	.03	4,600
		7/22	14	26		7.1	97	5.4	8.3	-	-	.02	46,000
		7/26	13	26	15	7.5	102	4.4	8.3	222	276	.05	4,300
		7/28	9	25		8.2	110	2.7	8.4	-	-	.01	2,400
		8/2	13	27	60	8.8	122	6.9	8.4	164	314	.02	430
		9/27	41	18	15	7.9	93	2.8	8.2	230	418	.01	1,500
		9/29	114	17		7.4	86	2.8	8.3	-	-	.02	930
		10/4	172	17	15	8.7	102	3.3	8.4	190	437	.01	4,600
		10/6	205	18		8.3	99	3.7	7.1	-	-	.03	4,600
		10/10	275	12	110	9.1	97	5.3	7.3	198	494	.02	Indeterm.
		10/12	275	12		9.5	100	4	8.2	-	-	.01	9,300
		10/14	180	12	45	9.6	100	3.5	8.2	204	352	.02	24,000
		10/17	172	10	40	9.5	96	3.2	8.3	200	342	.04	21,000
		10/18	172	15		9.1	102	3.3	8.3	-	-	.04	4,300